LaserWriter 16/600 PS

Basics

LaserWriter 16/600 PS

Read Me First

The LaserWriter 16/600 PS has the same form factor as the LaserWriter Pro 600/630, though some functions and parts are entirely different. If you want a detailed description of the new servicing issues presented by this printer, go to the document “New Servicing Issues” that is included on this CD. Below is a brief outline of this document.

New rear housing layout
- I/O controller easier to access
- D/C controller harder to access
- New I/O connectivity procedures
- Fax card option
- Internal hard drive option

Faster engine

- Modules not backward-compatible
- Feeders not backward-compatible
- Two new fans for ventilation
- Slightly louder (52 dB vs. 49 dB printing)

New printer utilities

Advanced multi-platform performance

New printer diagnostic

Printer Utilities

The printer utility that you use depends on the type of computer you use. This topic briefly describes the various utilities. Refer to chapters 3 and 4 of the user's guide for complete information

Note: Settings made with any of these printer utilities become default parameters and affect all printed documents, regardless of the computer that originated the print request.

Apple Printer Utility for Macintosh Computers

The Apple Printer Utility for Macintosh computers works only with the LaserWriter 16/600 PS. You use this utility to set parameters that reside on the printer's I/O controller board. You can use this utility to perform many functions, some of which are listed below.

- Naming the printer
- Initializing SCSI hard drives
- Downloading fonts
- Setting default printer resolution
- Setting default paper-handling options
- Setting default print density
- Printing configuration page
- Turning off the startup test page
- Setting communication protocols

Note: The LaserWriter Utility for Macintosh computers

does not work with the LaserWriter 16/600 PS.

The Apple Printer Utility has a hierarchical interface that is completely different than the LaserWriter Utility for the Macintosh that serves other laser printers.

After you launch the Apple Printer Utility and select a printer, a window opens that shows four headings. These headings are like folders in the Finder. If you click an arrow, the folder expands to show more items. The command “Print Configuration Page” is located in the File menu in the menu bar.

LaserWriter Utility for Windows

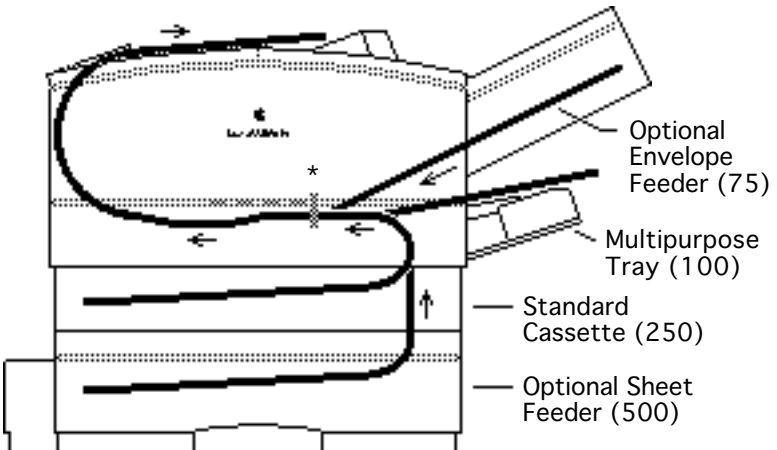
The LaserWriter Utility for Windows has the same functions as the Apple Printer Utility for Macintosh computers, except for certain hard drive and font functions which are absent from the Windows printer drive interface.

NetWare Utilities

There are two DOS utilities, LWPMAN and LWFORM, that perform a subset of Apple Printer Utility functions in a NetWare environment.

TCP/IP Printer Configuration Utility for UNIX

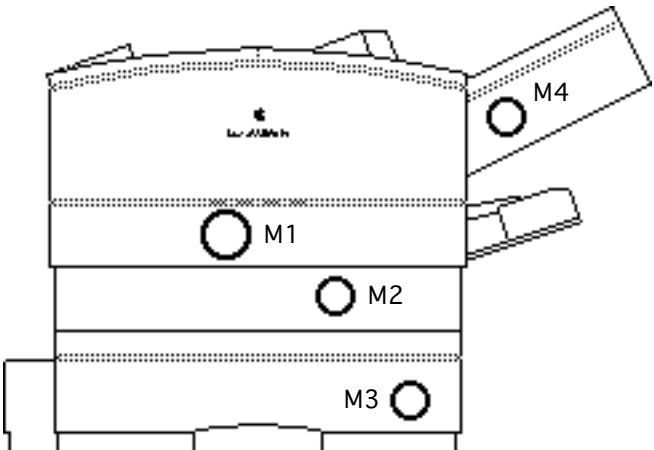
To configure the printer from a UNIX environment, run the TCP/IP Printer Configuration Utility by using the Telnet program.



Paper Path

There are four paper sources and one output tray in a complete system. The number in parenthesis is the capacity of the paper source.

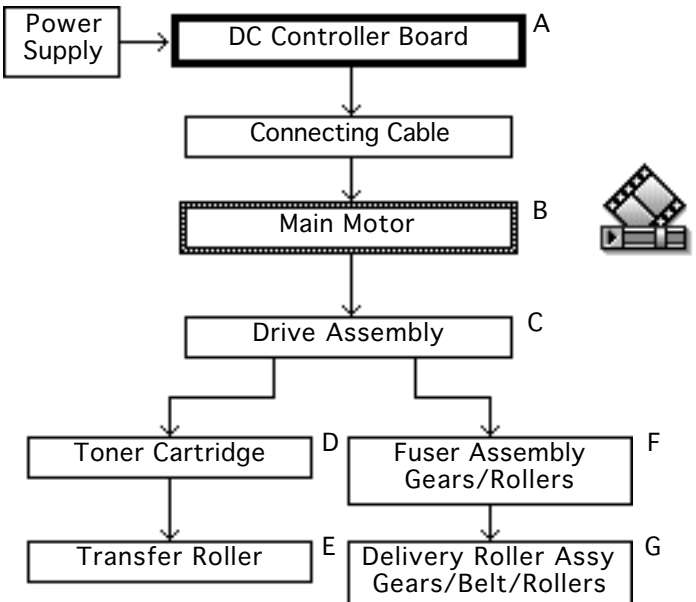
Note: The asterisk at the point where the paper paths meet denotes a synchronization pause. See PS602 in “Sensing System Theory” in this chapter.



Mechanical Drive Theory

There are four motors and four separate drive trains in a complete system. Two are in the printer engine and one is in each of the optional feeders.

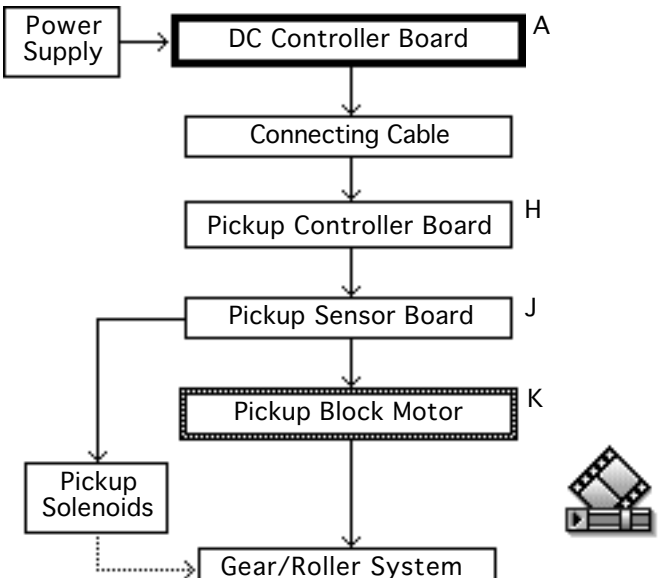
- M1 Main Motor
- M2 Pickup Block Motor
- M3 Sheet Feeder Motor
- M4 Envelope Feeder Motor



M1 Main Motor Drive

The main motor powers the system that transports paper from the toner cartridge to the delivery tray on top of the printer.

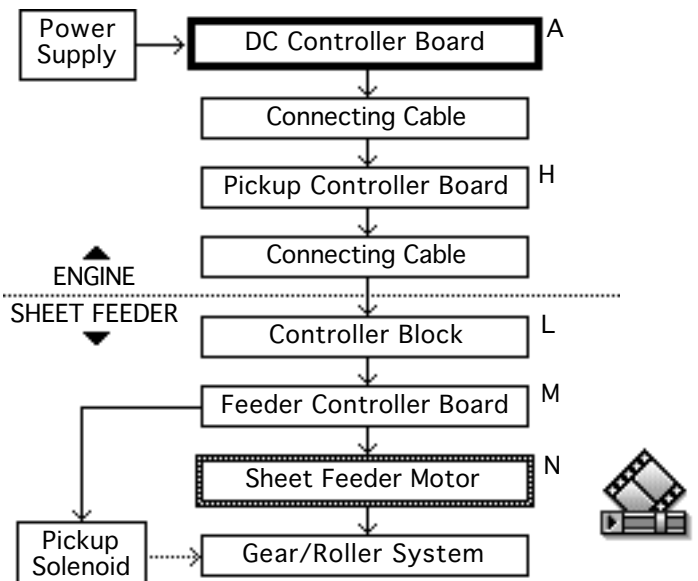
Note: The letters next to the boxes correspond to the labels in the mechanical drive animations that are available on the CD.



M2 Pickup Block Motor Drive

The pickup block motor powers the system that transports paper into the engine, through the pickup block, and up to the toner cartridge.

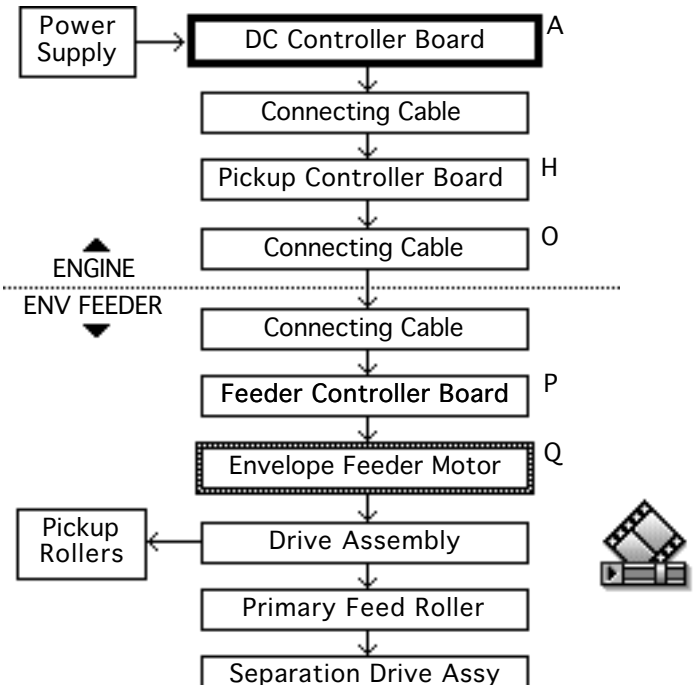
Note: The DC controller board does not connect directly to the pickup block motor. Make sure to troubleshoot the three intermediate blocks if there is a failure in pickup block drive.



M3 Sheet Feeder Motor Drive

The sheet feeder motor powers the system that transports paper from the 500-sheet cassette upward into the printer engine.

Note: Once the paper reaches the lower feed roller in the pickup block, engine components supply mechanical drive.



M4 Envelope Feeder Motor Drive

The envelope feeder motor powers the system that separates envelopes and feeds them into the printer engine.

Note: Once an envelope reaches the upper feed rollers in the pickup block, engine components supply mechanical drive.

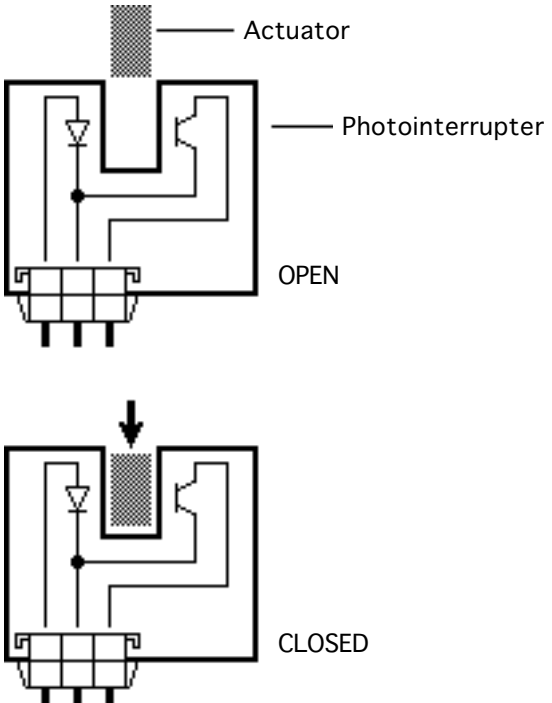
Sensing System Theory

There are six paper sensors, one dual-purpose sensor, and seven sensing switches in a LaserWriter 16/600 PS system:

Paper Sensors
- PS601: Cassette Paper Sensor
- PS602: Registration Paper Sensor
- PS701: Multipurpose Paper-End Sensor
- PS702: Multipurpose Paper-Present Sensor
- PS851: Sheet Feeder Paper-Present Sensor
- PS931: Envelope Paper-Present Sensor
- PS201: Delivery/Interlock Sensor

Sensing Switches
- SW601: Top Cover Interlock Switch
- SW603: Upper Cassette Size Sensing Switch

- •SW604: Upper Cassette Size Sensing Switch
- •SW605: Upper Cassette Size Sensing Switch
- •SW851: Lower Cassette Size Sensing Switch
- •SW852: Lower Cassette Size Sensing Switch
- •SW853: Lower Cassette Size Sensing Switch

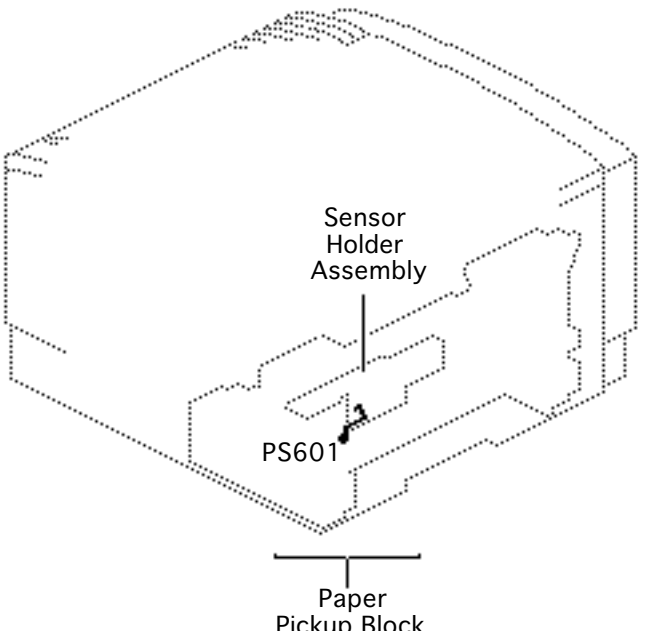


Paper Sensors

Paper sensors consist of an actuator, a U-shaped photo interrupter, and circuitry. Sensors are tripped as the actuator swings against movement of paper and blocks the gap of the U. An actuator can be passive (governed by gravity) or spring-loaded.

Note: Sensor failure can be either mechanical or electrical. When troubleshooting sensors, first confirm that the arm

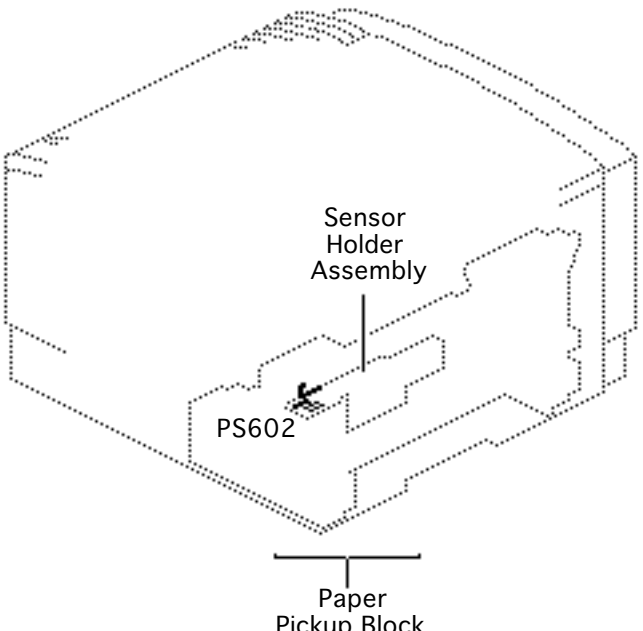
or lever moves freely without snagging, that any springs are applying correct resistance, and that the actuator is not broken. Then check that all cable connections are secure. If you have eliminated mechanical issues, proceed with electrical troubleshooting.



PS601

Cassette Paper Sensor

Actuator: A passive lever in the sensor holder assembly is tripped by insertion of a loaded cassette tray.



PS602

Registration Paper Sensor

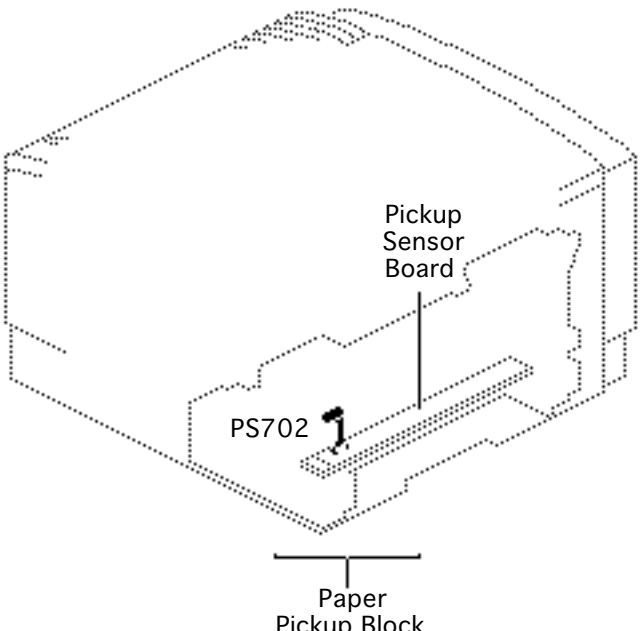
Actuator: A spring-loaded lever in the sensor holder assembly is tripped by arriving paper.

All paper stops at PS602 and waits for proper synchronization with drum rotation and mechanical drive.

Note: If paper does not reach sensor PS602 within the prescribed time after the pickup signal is issued, a

pickup unit delay jam exists and the controller stops printing.

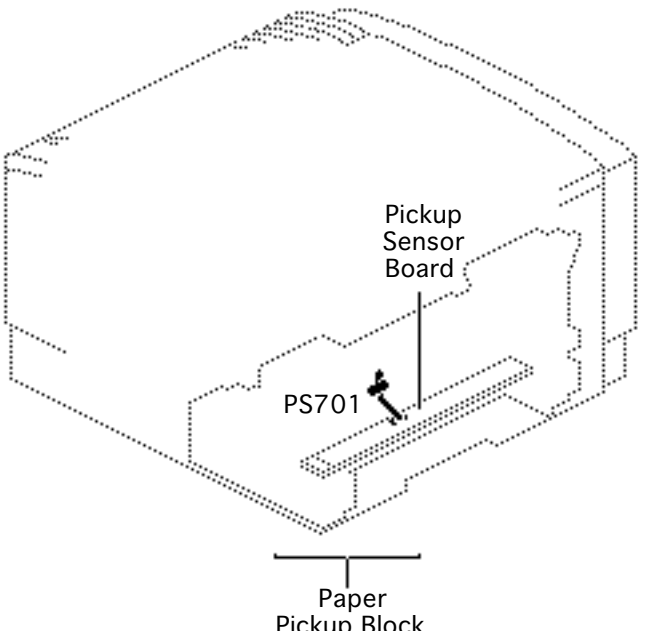
If paper reaches the sensor but does not clear it within the correct time, a pickup unit stationary jam exists. The time allowed for paper to clear is a function of paper size, which is detected by PS701 (for manually fed paper) and by sensing switches (for cassette-fed paper).



PS702

Multipurpose Paper-Present Sensor

Actuator: A spring-loaded lever in the paper pickup block is tripped by the leading edge of paper as it is loaded in the multipurpose tray.

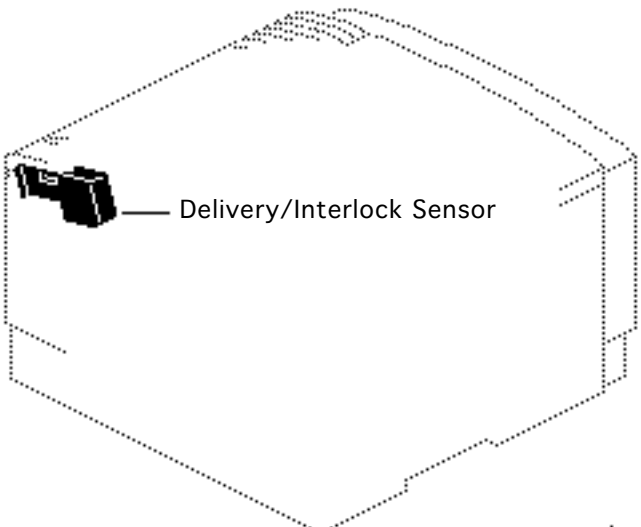


PS701

Multipurpose Paper-End Sensor

Actuator: A passive lever in the paper pickup block is tripped by the trailing edge of paper leaving the multipurpose tray.

Sensor PS701 detects the size of paper fed from the multipurpose tray.



PS201

Delivery/Interlock Sensor

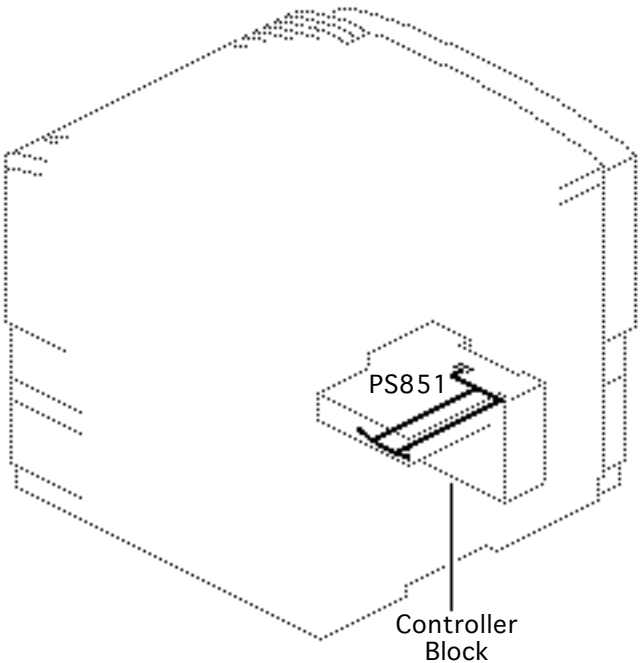
Actuator: A plastic tab on the fuser door and a sensing lever in the fuser assembly act independently to trip a photo interrupter.

PS201 detects two things: paper exiting the fuser and closure of the fuser door.

Note: If paper does not reach sensor PS201 within 5.2 seconds after it reached registration sensor J602, a delivery unit delay jam

exists and the controller stops printing.

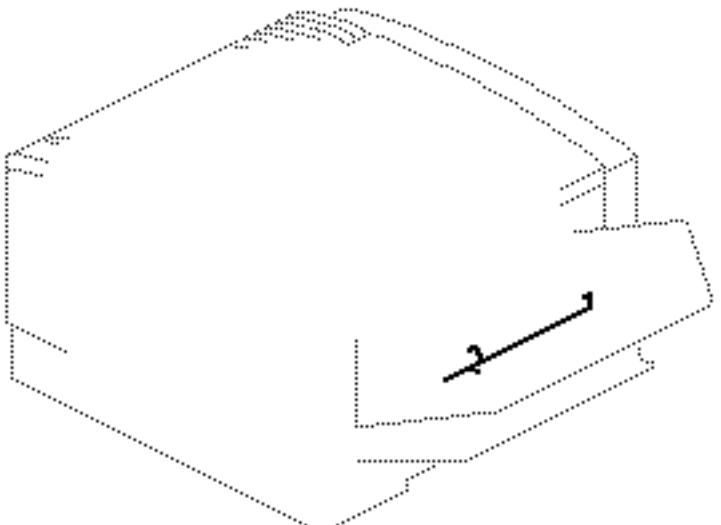
If paper reaches the sensor but does not clear it within the correct time, a delivery unit stationary jam exists. The time allowed for paper to clear is a function of paper size, which is detected by PS701 (for manually fed paper) and by sensing switches (for cassette-fed paper).



PS851

Sheet Feeder Paper-Present Sensor

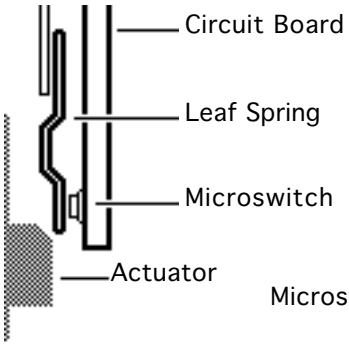
Actuator: A passive lever in the controller block is tripped by insertion of a loaded cassette tray.



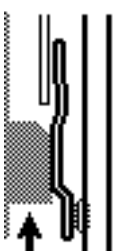
PS931

Envelope Feeder Paper-Present Sensor

Actuator: A spring-loaded lever is tripped by placement of envelopes into the feeder.



Microswitch ON



Microswitch OFF

Sensing Switches

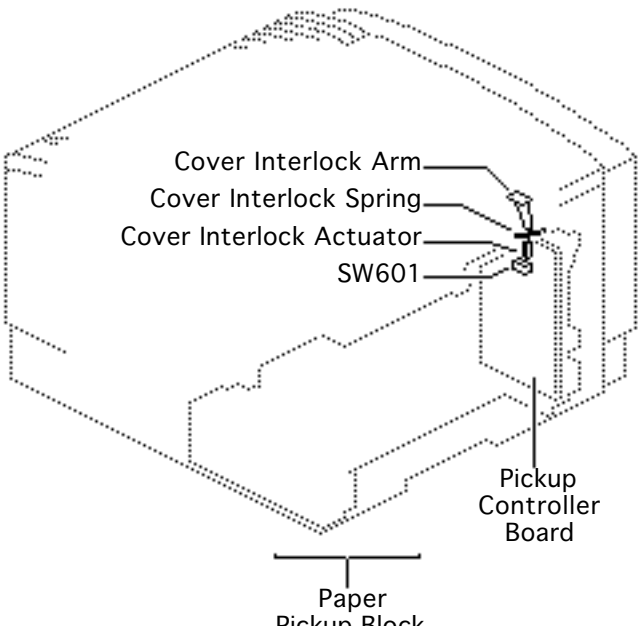
Sensing switches attach to a circuit board and do not use photo interrupters.

Switches are actuated by leaf springs that press inward as you insert a cassette tray or close the top cover.

Failure in sensing switches can be either mechanical or electrical. When troubleshooting switches, first confirm that the actuator has not broken off and then confirm that the leaf springs are not bent or

misshapen. You should be able to press the leaf spring with your finger and hear the clicking of the microswitch.

If you have eliminated mechanical issues, proceed with electrical troubleshooting.

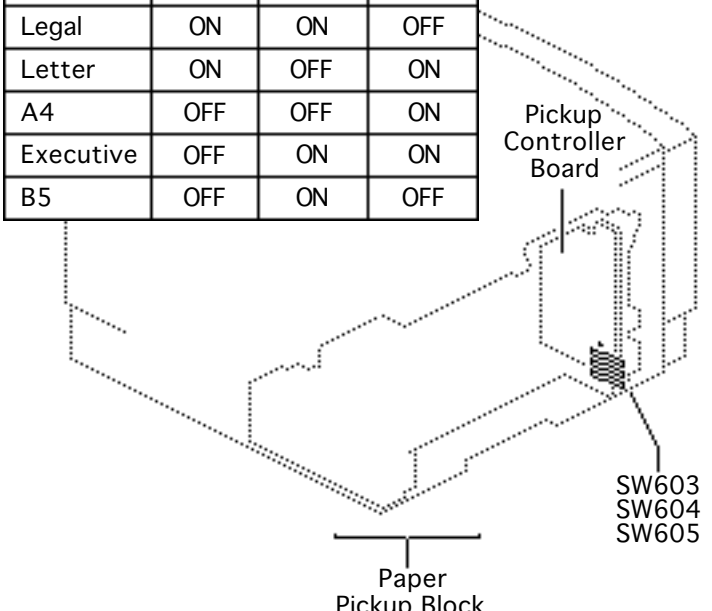


SW601

Top Cover Interlock Switch

Actuator: A tab on the top cover actuates a leaf spring and pin, which press the microswitch on the pickup controller board. See “Troubleshooting Tips” in Troubleshooting for information on defeating the top cover interlock switch.

Cassette	SW603	SW604	SW605
(None)	OFF	OFF	OFF
Legal	ON	ON	OFF
Letter	ON	OFF	ON
A4	OFF	OFF	ON
Executive	OFF	ON	ON
B5	OFF	ON	OFF

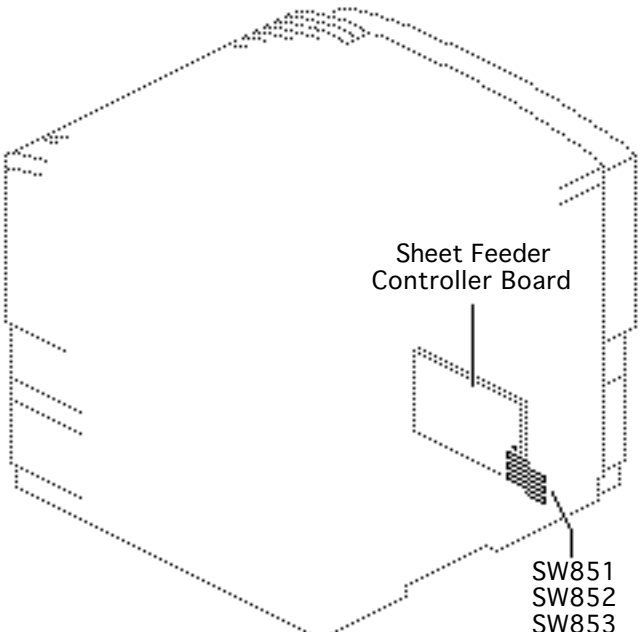


SW603/4/5

Cassette Size Sensing Switches (Upper)

Actuator: Plastic tabs on the side of the cassette trays actuate leaf springs, which press microswitches on the pickup controller board. The tab/switch configurations are as shown.

Note: See the next page for a note regarding the 250-sheet universal cassette.



SW851/2/3

Cassette Size Sensing Switches (Lower)

Actuator: Plastic tabs on the side of a cassette tray actuate leaf springs, which press microswitches on the sheet feeder controller board.

Note: The sheet feeder uses a 500-sheet universal cassette. As with the upper 250-sheet universal cassette, the tabs are set manually by adjusting a selection dial on the cassette.

When you are troubleshooting, be aware that human error can be a factor in paper-size sensing for these universal cassettes.

Test/Configuration Pages

There are three special pages that an operational LaserWriter 16/600 PS can print. Each indicates information that can isolate problems and/or identify the configuration of the printer.

Startup Test Page

The printer generates a startup test page 2-3 minutes after you switch on the printer. Successful printing of this page indicates that the I/O board is operational.

> **Note:** The startup test page may not print due to software disabling (see “Printer Utilities” in Basics).

Service Test Page

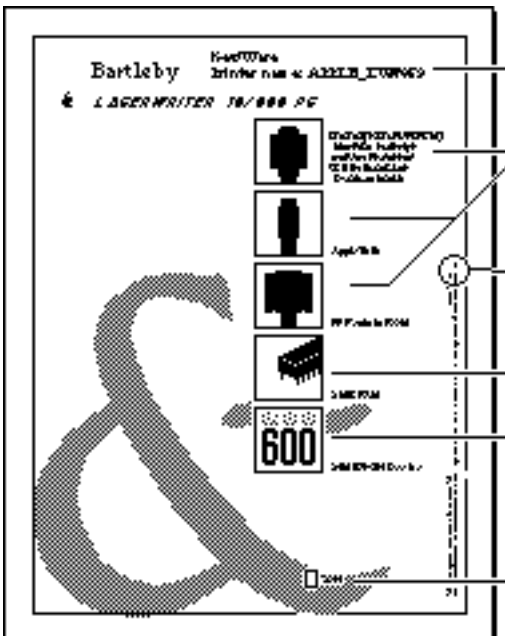
The printer generates a service test page when you press the service test page button. Successful printing of this page indicates that the printer engine is operational.

Configuration Page

The printer generates a configuration page when you issue the “Print Configuration Page” command with the printer utility.

Note: The “Print Configuration Page” command in the Apple Printer Utility is located in the File menu.

Startup Test Page



Printer Names

Communication parameters and printer control language selected for an individual printer port

ROM version

Installed RAM

Printer Resolution

Number of pages the I/O board has produced

Other startup icons

FinePrint enabled

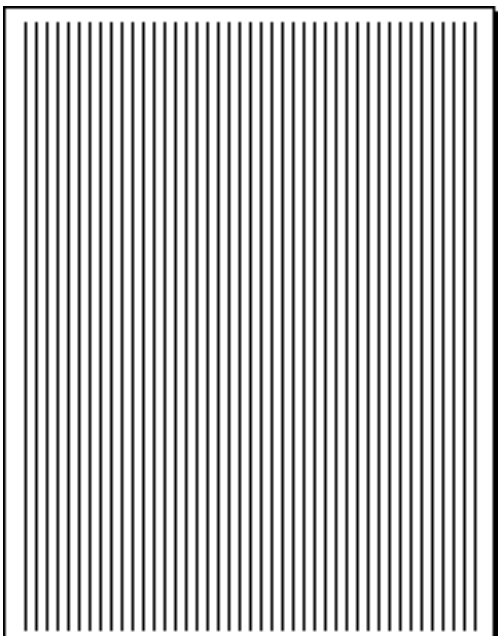
PhotoGrade enabled

Hard drive on-line

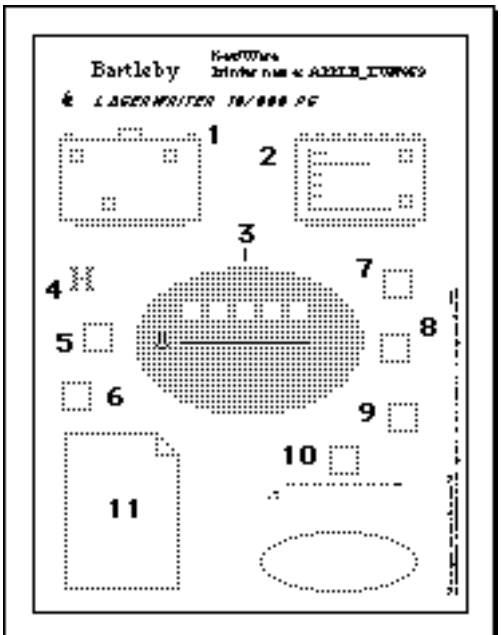
Optional feeders installed

Service Test Page

To access the service test page button, open the multipurpose tray. The button is located in the upper right corner of the opening. The button is small and difficult to see against the black plastic. Use a paper clip or similar tool to press the button.



The service test page pattern is a series of vertical lines that cover the imageable area of the page.



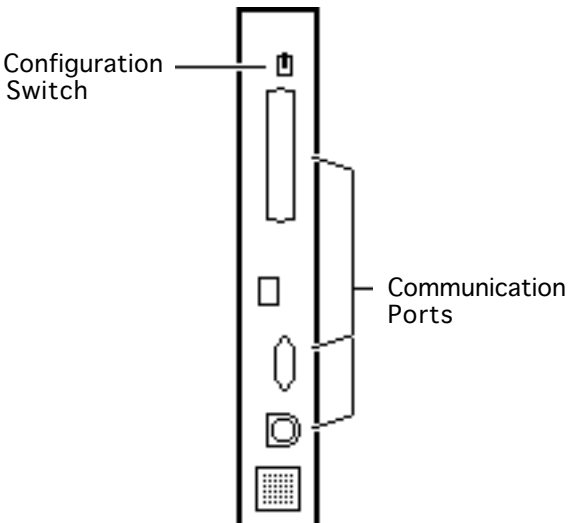
Configuration Page

This page provides the following information to the service technician.

- Network address settings (1)
- Amount and allocation of RAM memory and readout of EEPROM integrity (2)
- Switch configurations (3)
- HP LaserJet® emulator version (4)
- Startup page setting (on or off) (5)
- LaserWriter serial number (6)

- Halftone screen settings (7)
- System administrator password (8)
- Timeout settings (9)
- SCSI ID of printer and attached drives (10)
- Default paper tray and margin offsets (11)

If possible, always print a configuration page before calling Apple Technical Assistance Center.



Configuration Switch

The configuration switch is located at the top of the I/O controller board end bracket. Configuration refers to the communication protocols that you assign to each of the three ports.

When you set communication protocols on older LaserWriter printers, you typically set a configuration switch that has numerical settings similar to a SCSI ID switch. The number you

choose corresponds to one of ten codes in a predefined configuration matrix.

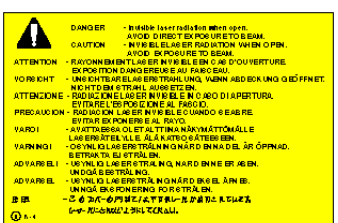
With the LaserWriter 16/600 PS, the configuration switch is a toggle between standard (down) and custom (up) values. You define custom settings through software (see “Printer Utilities” in Basics). This scheme allows users greater flexibility in establishing configuration.

LaserWriter Safety

Unplug Printer

LaserWriter printers operate at high voltages. To prevent serious injury, always switch off the printer and unplug the AC power cord before servicing the printer.

Laser Beam Safety


DANGER - Invisible laser radiation when open. AVOID DIRECT EXPOSURE TO BEAM.
CAUTION - INVISIBLE LASER RADIATION WHEN OPEN. AVOID EXPOSURE TO BEAM.
ATTENTION - RAYONNEMENT LASER INVISIBLE EN CAS D'OUVERTURE. EXPOSITION DANGEREUSE AU FAISCEAU.
VORSICHT - UNSICHTBARE LASERSTRAHLUNG, WENN ABDECKUNG GEÖFFNET. NICHT DEM STRAHL AUSSETZEN.
ATTENZIONE - RADIAZIONE LASER INVISIBILE IN CASO DI APERTURA. EVITARE L'ESPOSIZIONE AL FASCIO.
PRECAUCION - RADIACION LASER INVISIBLE CUANDO ESTA ABIERTO. EVITAR EXPONERSE AL RAYO.
VARO! - AVATTAESSA OLET ALTTIINA NÄKYMÄTTÖMÄLLE LASERSÄTEILYLLE. ÄLÄ KATSO SÄTEESEEN.
VARNING! - OSYNLIG LASERSTRÅLNING NÄR DENNA DEL ÄR ÖPPNAD. BETRAKTA EJ STRÅLEN.
ADVARSEL! - USYNLIG LASERSTRÅLING NÅR DENNE ER ÅBEN. UNDGÅ EKSPONERING FOR STRÅLEN.
ADVARSEL - USYNLIG LASERSTRÅLNING NÅR DEKSEL ÅPNES. UNNGÅ EKSPONERING FOR STRÅLEN.

Never disconnect the beam-detect cabling or laser shutter when the printer is switched on. Also be careful not to place screwdrivers or other shiny objects in the path of the laser beam. The reflected laser beam, though invisible, can permanently damage your eyes.

Never remove the cover of a laser/scanner assembly, whether the printer is powered on or not.

Fuser Heat

The fuser assembly rollers become very hot during printer operation. Before servicing the fuser assembly, switch off the printer for at least 5 minutes to allow the fuser assembly roller to cool.

Toner Safety

Toner is a nontoxic substance composed of plastic, iron, and a small amount of pigment. Clean skin and clothing by removing as much toner as possible with a dry tissue, then washing with cold water. Hot water causes toner to jell and permanently fuse into clothing. Toner attacks vinyl materials, so avoid contact with vinyl.

Weight

LaserWriter printers are heavy. When lifting or moving the printer, be careful not to strain your back.

Specifications

LaserWriter 16/600 PS

Engine

Engine	Canon LBP-P430 engine
Printing Method	Electrophotography using single-component microfine toner
Optical System	Semiconductor laser and a rotating six-faced prism scanning mirror
Resolution	600 dpi

Dimensions	Height: 12.08 in. (307 mm) Width: 16.73 in. (425 mm) Depth: 16.89 in. (429 mm)
Clearance Required	50.4” x 24.25” x 19.75” high (1282 x 616 x 501 mm)
Weight	Printer with cassette: 42.02 lb. (19.1 kg): Toner cartridge: 3.3 lb. (1.5 kg)
Operating Environment	Temperature: 50-90.5° F (10-32.5° C) Humidity: 20-80% relative humidity Atmospheric Pressure: 570-760 mmHg

Power Consumption Approximately 0.79 kW at 71° F (20° C)

Noise Level

Sound Power Level:
66 dB or less (printing)
47 dB or less (standby)
Sound Pressure Level (Bystander Position)
52 dB or less (printing)
34 dB or less (standby)

Printing Speed

17.1 pages per minute (letter)
16.2 pages per minute (A4)

Duty Cycle No limit in pages per month

Consumables Service Life

Pickup Rollers: 200,000 pages
Separation Pad: 200,000 pages
Fuser Assembly: 200,000 pages
Transfer Roller: 200,000 pages
Power Supply Fan: 25,000 hours
Controller Board Fan 25,000 hours
Front Fan 10,000 hours
Replace the multipurpose pickup roller and separation pad together. The separation pad is contained in the multipurpose tray guide assembly.

Macintosh Requirement

System Software 7.0 or later

Printable Area (in inches)	US Letter: 8.11 by 10.79 US Legal: 8.11 by 13.79 A4: 7.89 by 11.44 B5: 6.72 by 9.81

I/O Board

CPU

AMD 29030 (RISC) running at 25 MHz

RAM

8 MB, expandable to 32 MB.
Refer to “Upgrading RAM” in Upgrades for more information.

ROM

4 MB standard
ROM may be either soldered or in the form of SIMMs. If you are returning an I/O controller board to Apple that uses ROM SIMMs, those SIMMs must accompany the board. Replacement I/O controller boards that do not have soldered ROM will have separately-bagged ROM SIMMs that you will need to install onto the board.

Pinouts

LocalTalk, Ethernet, and parallel connections

Settings

The LaserWriter 16/600 PS features automatic traffic control. The printer can accept jobs simultaneously from AppleTalk, TCP/IP, and NetWare networks and from the parallel port, automatically switching between PostScript and PCL5 languages. No manual intervention is required if the standard communication settings are adequate. See “Configuration Switch” in Basics for information about customizing these settings.

Imaging Languages Supported

QuickDraw, PostScript Level 2 (2014), and HP PCL 5

Fax Card

Features

When equipped with the fax card, the LaserWriter 16/600 PS

- Sends documents to any Group III-compatible fax machine or printer from an Apple Macintosh or IBM PC compatible computer.
- Receives and prints faxes at 200dpi from Group III-compatible fax machines.
- Receives and prints faxes at 600dpi from other printers equipped with PostScript fax capability.
- Send PostScript-language files to other printers that have PostScript fax capability so that documents print at the resolution of the receiving printer.
- Sends and receives documents at speeds up to 9600 bps.

Note: There are two fax cards available from Apple, one for use in the United States and one for international use. The USA fax

card has built-in modem capability and can be connected directly to an analog phone line. The international fax card is designed to connect into an external modem.

Sheet Feeder

Dimensions	Height: 5.28 in. (134 mm) Width: 16.38 in. (416 mm) Depth: 18.15 in. (461 mm)
Weight	13.2 lb. (6.0 kg) with cassette
Power Consumption	24 VDC supplied by printer

Envelope Feeder

Dimensions	Height: 5.03 in. (127.8 mm) Width: 12.04 in. (306.5 mm) Depth: 11.53 in. (293 mm)
Weight	5.72 lb. (2.6 kg)
Power Consumption	24 VDC supplied by printer

Paper

Input Sources and Capacities

Standard cassette (250)
Multipurpose tray (100)
Lower cassette (500)
Envelope feeder (75)

Output Source

Face-down delivery tray

Paper Sizes

Standard Cassette:
A4, B5, legal, letter, or executive plain paper (16-24 lb.)
Cassettes available: letter, A4, or universal

Multipurpose Tray
Plain paper from 7.16 in. by 10.1 in. to 8.5 in. by 14 in. (16-32 lb.), envelopes, and fuser-compatible labels and film

Lower Cassette
A4, B5, legal, letter, or executive plain paper (16-24 lb.)
Cassette available: universal

Envelope Feeder
COM-10, DC, Monarch, C5, B5 (recommended envelope); from 3.54 in. by 7.44 in. to 7.0 in. by 10.0 in.

Note: Do not use envelopes with clasps, snaps, windows, or synthetic materials. Envelopes with peel-off adhesive strips or double sealable flaps must use fuser-compatible adhesive.

Troubleshooting

LaserWriter 16/600 PS

General

Troubleshooting contains quick-reference troubleshooting information for the LaserWriter 16/600 PS. We encourage you to review and print out this chapter before troubleshooting a printer.

At the end of this chapter are troubleshooting flowcharts and tables. If a table name clearly addresses your problem, you can go directly to that table. If not, you should go to the flowchart associated with the version of the printer you are working on.

Power–On Self Test (POST)

When you switch on power, the LEDs are designed to illuminate in a specific sequence as the printer comes ready. In a functioning printer, all LEDs briefly illuminate about a second after you turn on the printer to confirm power distribution . They then extinguish and pulse as the fans power up and main motor rotation takes place. About 5-6 seconds into printer startup, all LEDs will again illuminate for one second. This marks the beginning of the Power-On Self Test (POST).

POST is a diagnostic procedure built into the I/O controller board that tests four areas: the SIMM/CPU, the I/O controller, the engine, and a fax or hard drive, if present. As each checks passes, the leftmost LED extinguishes. When all four checks have passed, all LEDs remain extinguished for one second. The ready LED will then flash once. The Power-On Self Test then ends, and control passes over to the PostScript interpreter.

Note: The LED array that POST uses has no correlation to jam, low-toner, or paper-out conditions. POST simply uses those LEDs to relay coded feedback. Once control passes over to the PostScript interpreter, the engine sensing system engages and LEDs do correlate to their labels.

When POST does detect an error, it exits the LED-extinguishing sequence and alternately flashes the toner and jam LEDs until you turn off the printer. Observing which LEDs had extinguished prior to the error array can help isolate the fault to one of the four areas indicated.

POST Pass

This movie shows where POST occurs during startup.

POST Fail

This movie shows an example of a detected engine problem.

LED Arrays

This image shows the normal meanings of LEDs.

Printer Diagnostic (EPOST)

Whereas the Power-On Self Test (POST) occurs during every printer startup, the Extended Power-On Self Test (EPOST) occurs only with intervention of the service technician. EPOST is a diagnostic built into the I/O controller board that is designed to run when the printer is in a modified state of operation.

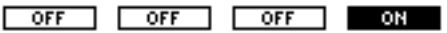
To enable EPOST, turn off the printer, install a serial loopback connector into the I/O controller serial port, and set the configuration switch to the “up” position. Turn the printer on.

EPOST startup behavior is identical to POST up to the point where an error is detected. In POST, startup is terminated and a general error display is reported to the LED panel. In EPOST, error reportingis extended. Consequently, about a dozen, more specific, error codes are able to be displayed. See next page for a chart of failure error codes.

If EPOST detects an error, the LEDs will cycle through the following sequence until you turn off the printer. The QuickTime movie below animates this cycle.

- All LEDs on for one second
- All LEDs off for one second
- Failure error code for two seconds
- All LEDs off for one second

Caution: When you have finished running the Extended POST diagnostic, be sure to remove the serial loopback cable and set the configuration switch in its original position. Any readout other than those shown above is an unknown error that cannot be detailed any more specifically.



I/O Controller Board

ROM SIMM A

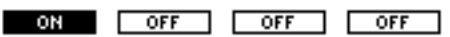
RAM Size

RAM SIMM (Low)

RAM SIMM (High)

Engine Controller (Interface or NVRAM)

Fuser Assembly



Laser/Scanner Assembly

Misc. Engine (Operator or Unknown Error)

Engine Fan (1 or More)

Main Motor

SCSI Hard Drive (Present but Failing)

The LaserWriter 16/600 PS requires the mini DIN-8 serial loopback connector that is listed as part of one of the diagnostics kits available from Apple. This connector can also be ordered separately as part number 922-1489.

Serial Loopback Connector

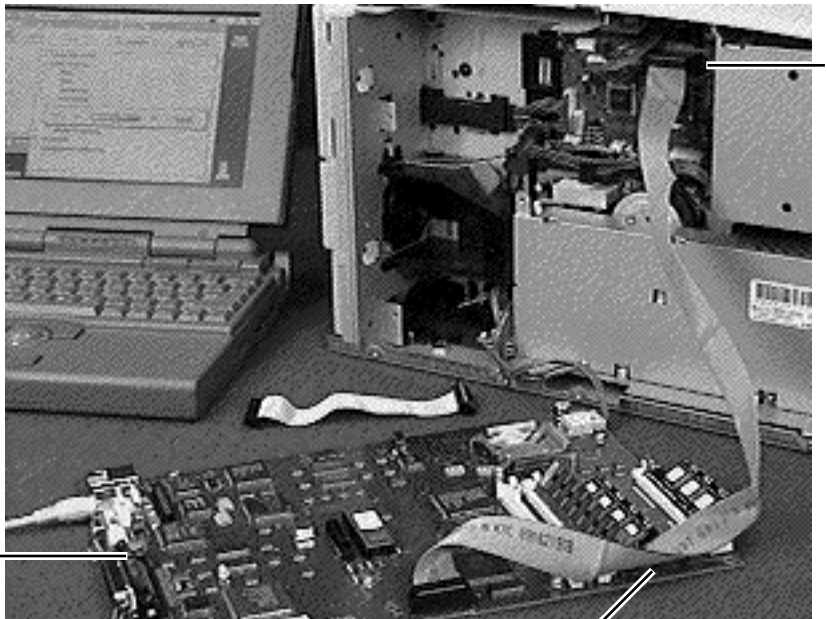
For those service providers who would like to build their own loopback connector, the plug consists of a male mini DIN-8 connector with pins 1 and 2 tied together using a piece of small-gauge wire-wrap wire. The pins on the male end of the mini DIN-8 connector are numbered as shown:

Maintaining I/O Connectivity

If you want to troubleshoot the printer while maintaining connectivity to a host computer, you must temporarily reposition the printer's I/O controller board. In this reconfigured state, you will be able to print from a paper source other than the standard cassette, observe the behavior of LEDs during startup, or run the printer diagnostic, while still having the engine open for troubleshooting.

To reconfigure the I/O controller in this way, remove the rear panel, I/O controller board, and I/O shield. Remove the printer interface cable from the I/O controller board and temporarily substitute a Quadra 900/950 floppy drive 20-pin cable. Connect the free end of this long interface cable to connector J207 on the DC controller board. Reconnect the power cable to connector J15.

Maintaining
I/O Connectivity



Troubleshooting Tips

Multimeter Probes

The connectors within the LaserWriter 16/600 PS are very small and require sharp needle-point probes to make good contact. Do not use probes that do not make proper contact. To see whether a set of probes works properly, test resistance at connector J210 on the DC controller board in the manner described below (the cable must connected to the board).

Set your multimeter to resistance and insert the probes at pins 1 and 10. If the reading indicates continuity then the probes are making good contact. If the reading indicates infinite resistance, then the probes do not make contact and should not be used with this printer.

Forcing a Feed Cycle

If you want to print from anything other than the standard 250-sheet cassette tray, you must be connected to a CPU and select the feed option that you want. It is not possible to print a service test page from any source other than the standard cassette.

Interrupting a Print Cycle

Interrupting a print cycle and inspecting the photosensitive drum can help isolate the cause of print quality problems. If the image on the surface of the drum exhibits the same problem as the printed page, the fault is before the drum, probably in the imaging system.

If the image on the drum is OK, the fault is after the drum, probably in the fuser assembly, transfer block, or high-voltage power supply. To inspect the drum in this way, run a print and wait until the paper clears the synchronization pause at the registration paper sensor. Open the toner access door, remove the toner cartridge, and pull back the shield to inspect the drum.

Maintaining Pickup Connectivity

To troubleshoot the paper pickup block, you must temporarily reconfigure the printer's paper path so that the pickup block is exposed. In this reconfigured state, you will be able to take voltage readings from the pickup controller board and observe paper feeding from the cassette.

Note: Since paper will jam due to the disruption of the paper path, you must disable the startup test page (see "Printer Utilities" in Basics) before turning the printer back on. Make sure to enable the startup test page before returning the printer to the customer.

To reconfigure the paper path, remove the pickup block, set it at an angle to the printer, and reconnect cables J601 and J603 at the leading edge of the pickup controller board. Insert the cassette tray into the pickup block. Press down the top cover interlock actuator and force the interlock switch closed by wedging in the

hooked end of the green cleaning brush. Reinstall the top cover and cover liner and close the lid.

If you want to test pickup from the multipurpose tray or the envelope feeder, you must maintain I/O connectivity (see previous topic). You cannot run a service test page from any source other than the standard 250-sheet cassette.

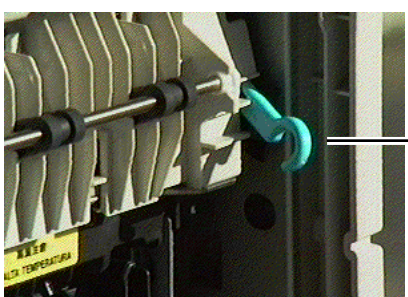
Caution: Do not let the pickup controller board brush up against the metal chassis when performing this procedure.

Defeating the Top Cover Interlock

You may occasionally need to defeat the top cover interlock to simulate a “top cover shut” condition. To defeat this sensor, open the toner access cover and wedge a stiff, non-metallic insert into the interlock switch opening. Push the insert down to depress the interlock leaf spring.

Defeating the Fuser Door Interlock

You may occasionally need to defeat the fuser door interlock to simulate a “fuser door shut” condition (for example if you wanted to observe paper as it exits the fuser rollers). To defeat this sensor, open the fuser access door and wedge the brush end of the green cleaning brush into the delivery/interlock sensor.



Caution: Do not insert the brush too far into the sensor. After removing the brush, make sure that the delivery sensing arm moves freely and is not snagged.

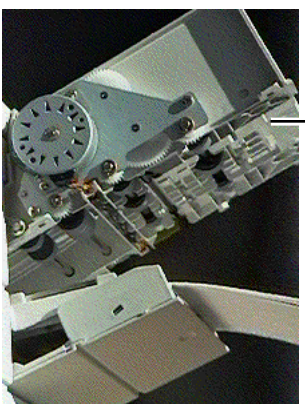
Sheet Feeder Bypass

You can visually troubleshoot a functioning stand-alone sheet feeder by bypassing connector J603 on the printer's pickup controller board.

Disable the startup test page, and remove the top cover, rear panel, and right corner panel from the printer. Disconnect J603 from the exposed edge of the pickup controller board and connect a spare sheet feeder interface cable (P/N 922-0219). Plug the opposite end of the interface cable into the sheet feeder receptacle.

Observing Envelope Feed

You can visually inspect and/or take multimeter readings from a fully functioning envelope feeder. Remove the covers of the feeder and install it into the printer. The feeder will operate in normal fashion.



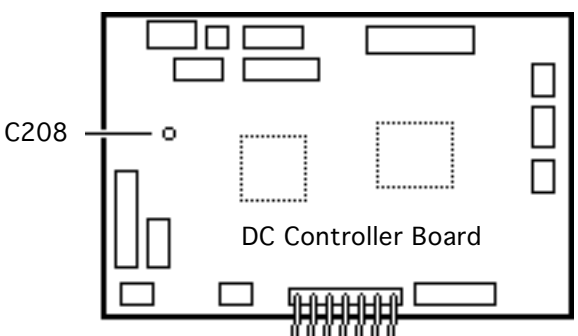
Drum Exposure

Cover the toner cartridge when you remove it from the printer. Prolonged exposure to light can result in print quality problems.

If this has occurred, store the toner cartridge in a dark place. The drum will return to its normal condition after about 24 hours.

Capacitor Discharge

When there is a failure of the fusing system, the DC controller board shuts off current to the fuser roller heater and charges capacitor C208 to prevent overheating. If there is a failure of the fusing system, you must turn the power off for about 10 minutes or manually discharge the capacitor before switching power back on.

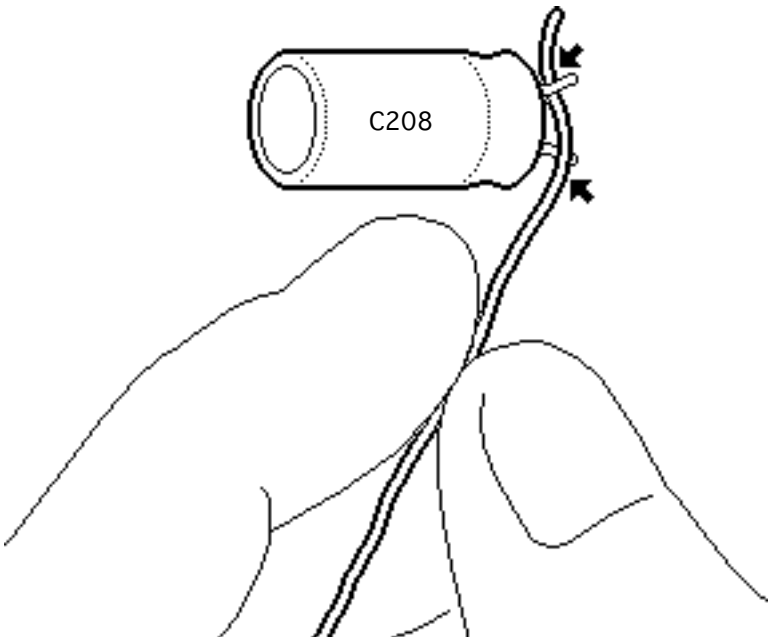


Caution: Be sure to switch off power and unplug the printer before performing this procedure.

To discharge capacitor C208, switch off the printer and remove the rear panel, I/O controller board, and I/O shield. Carefully jumper the two wires at the base of the capacitor using some kind of conductor.

Note: There are many different tools that can be used to discharge the capacitor: a flat blade screwdriver, paper clip, or aluminum foil doubled over. The tool illustrated is a length of lead solder. It has the advantage of being ductile and is less apt to damage the controller board.

Discharging
Capacitor C208

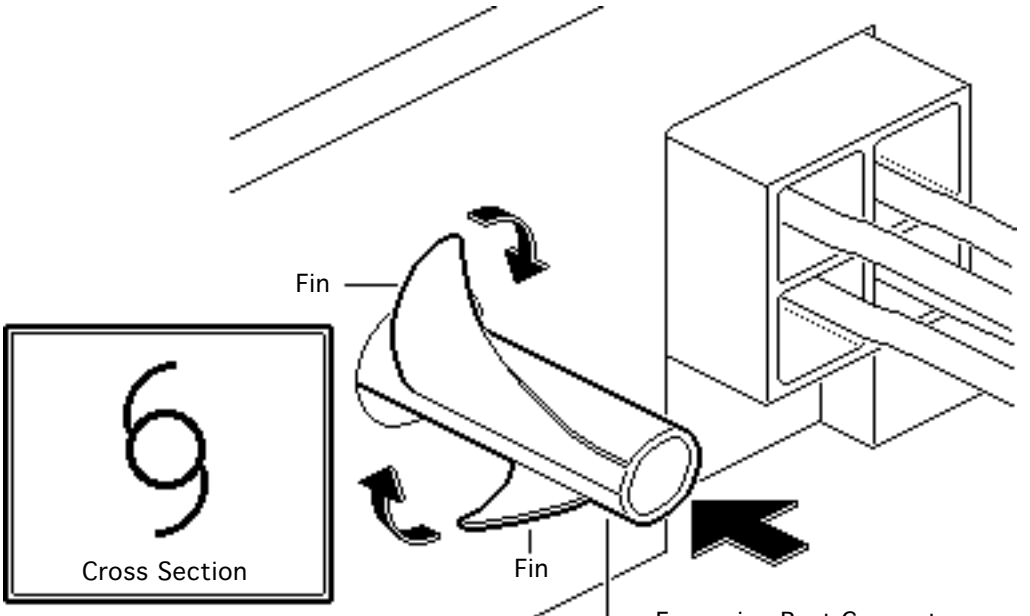


Expansion Post Connectors

The LaserWriter 16/600 PS has several cable receptacles that are secured to the printer by finned post connectors. The fins expand when you insert the connector, but once the connector is installed it can be difficult to remove.

If you cannot remove these connectors with your fingers, try small bent-nose pliers, a 5 mm nut driver, or grip-rings forced around the post.

Caution: The cable receptacles are keyed. If you install them upside-down, they will not couple properly.


Fin
9
Cross Section
Fin
Expansion Post Connector

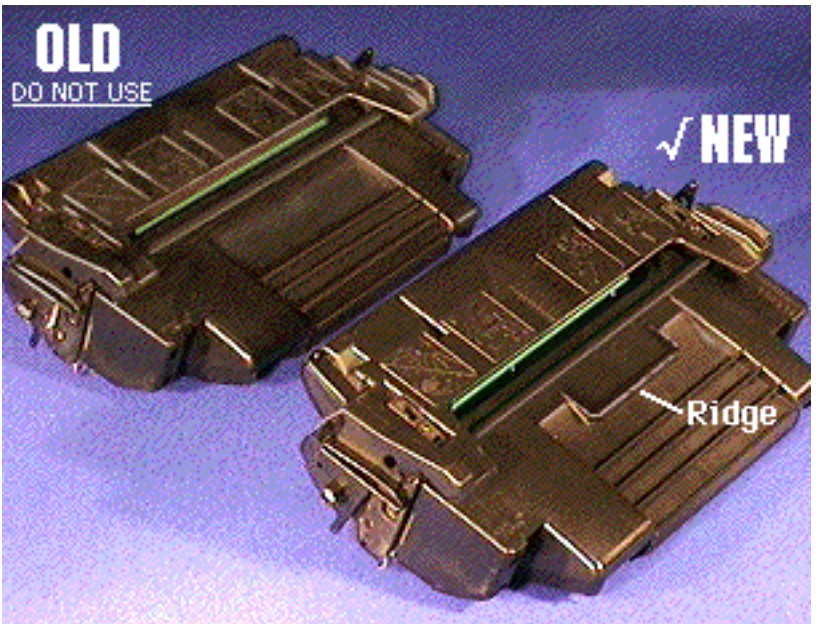
Toner Cartridge Modification

LaserWriter toner cartridge part number M2473G/A is the only cartridge from Apple specifically designed for the LaserWriter 16/600 PS.

However, you may also use Revision B LaserWriter Pro 600/630 toner cartridges in the LaserWriter 16/600 PS. The Revision B cartridges were introduced in late 1993 and were designed to be forward-compatible.

Warning: You must not use the original version of the LaserWriter Pro 600/630 toner cartridge in the LaserWriter 16/600 PS. You can distinguish the new revision B toner cartridge by the 1" x 3.5" molded ridge on the top surface. If this ridge is not present, do not use the toner cartridge with the LaserWriter 16/600 PS.

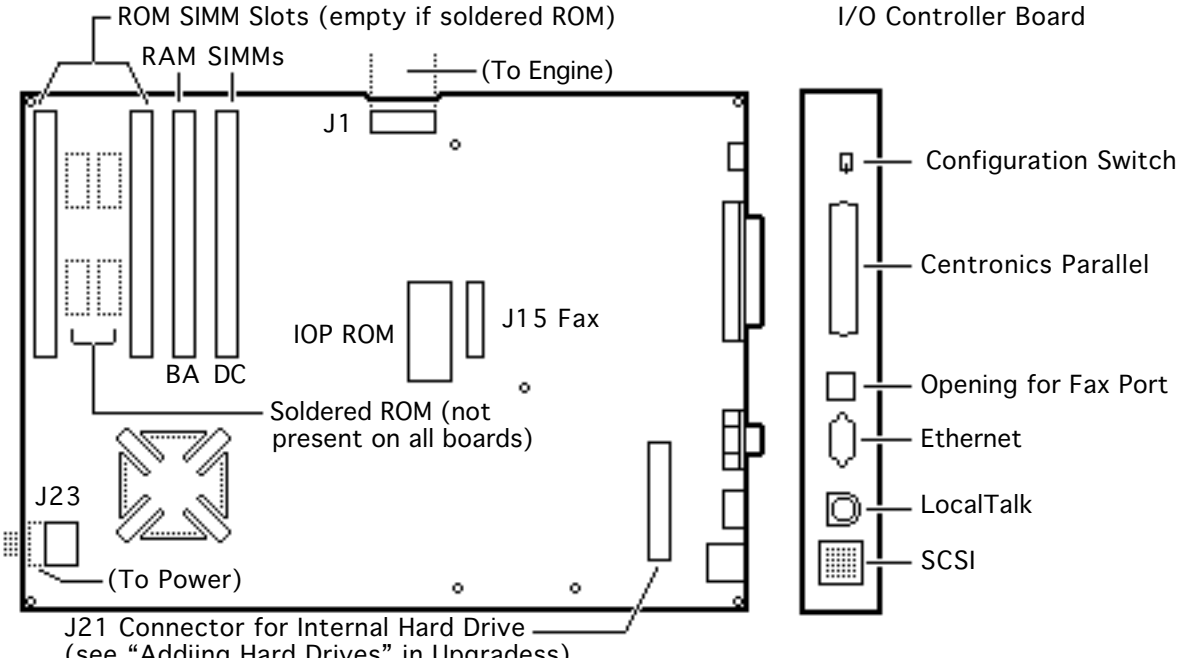
Toner Cartridge Modification



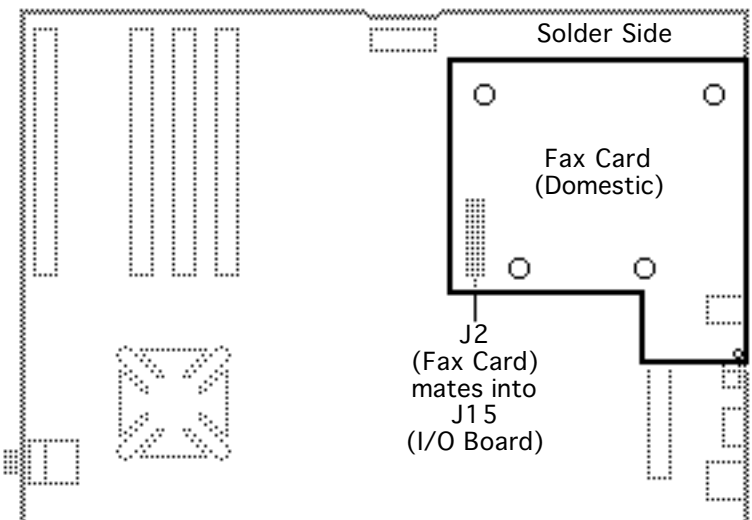
Circuit Board Diagrams

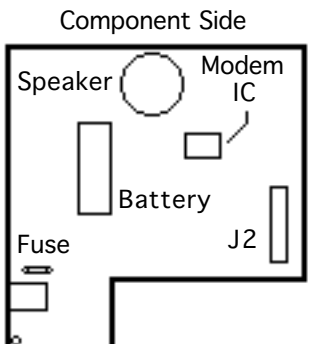
On the following pages are diagrams of the circuit boards and high-voltage contacts listed below:

- I/O Controller Board
- Fax Card (Domestic)
- Fax Card (International)
- DC Controller Board
- Pickup Controller Board
- Pickup Sensor Board
- High-Voltage Power Supply
- Envelope Feeder Controller Board
- Sheet Feeder Controller Board


ROM SIMM Slots (empty if soldered ROM)
RAM SIMMs
(To Engine)
J1
IOP ROM
J15 Fax
BA
DC
Soldered ROM (not present on all boards)
J23
(To Power)
J21 Connector for Internal Hard Drive
(see “Addiing Hard Drives” in Upgradess)
I/O Controller Board
Configuration Switch
Centronics Parallel
Opening for Fax Port
Ethernet
LocalTalk
SCSI

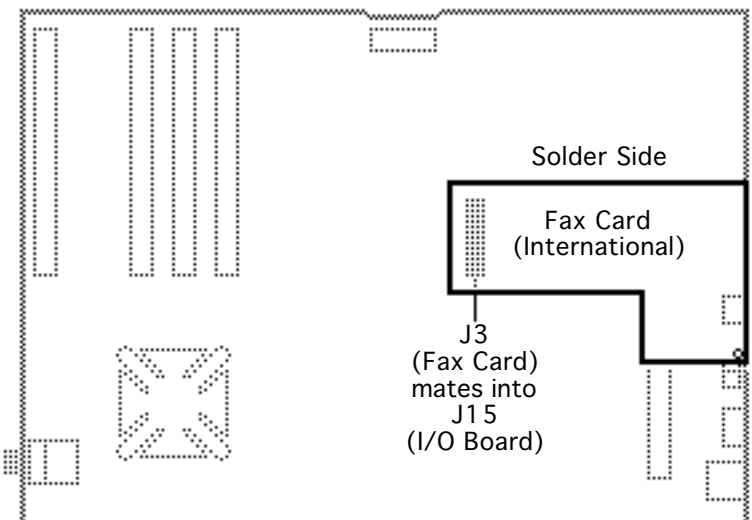
Fax Card (Domestic)

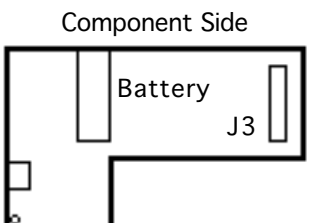




Ghosted image is outline of I/O controller board.

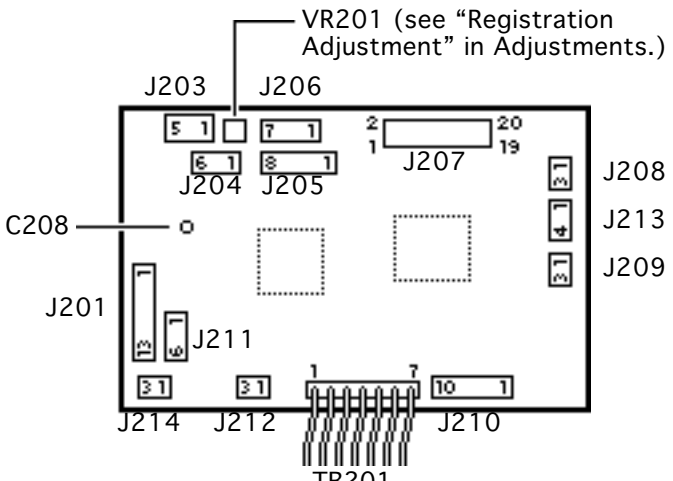
Fax Card (International)

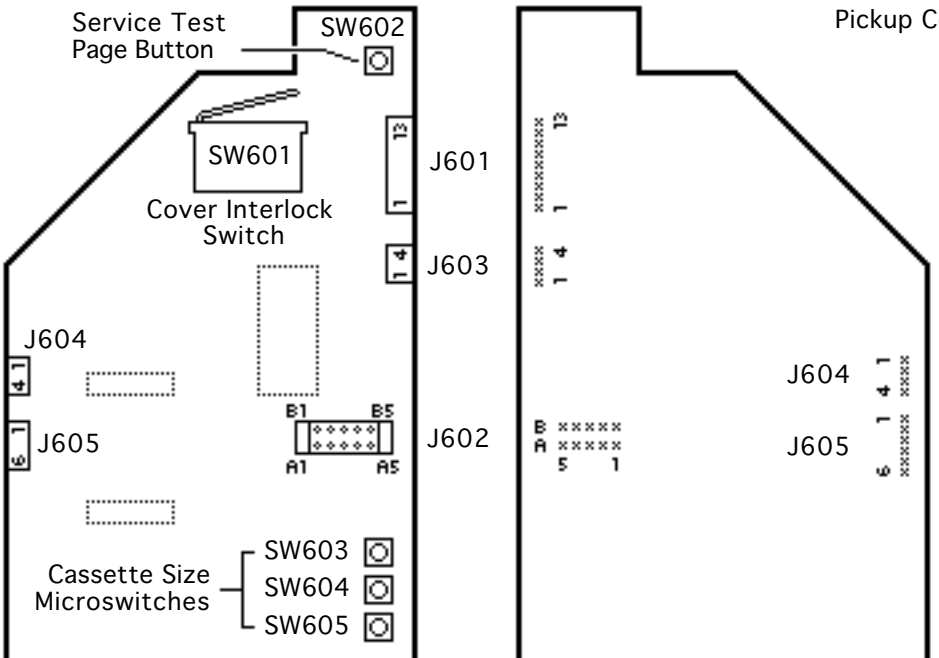




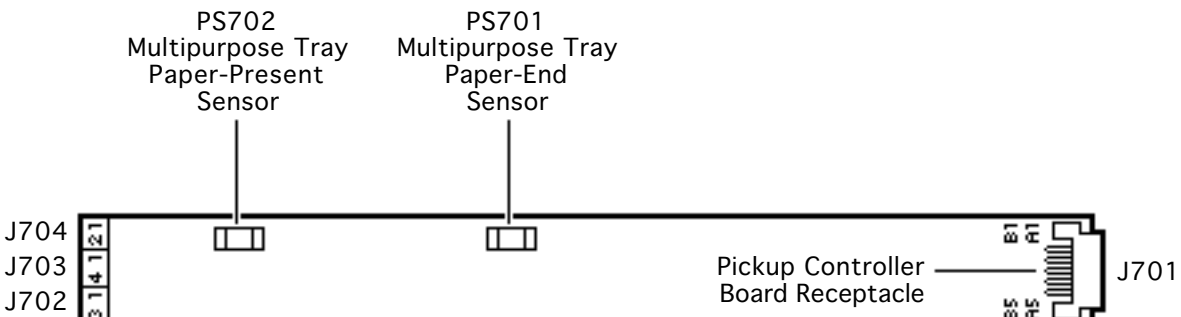
Ghosted image is outline of I/O controller board.

DC Controller Board

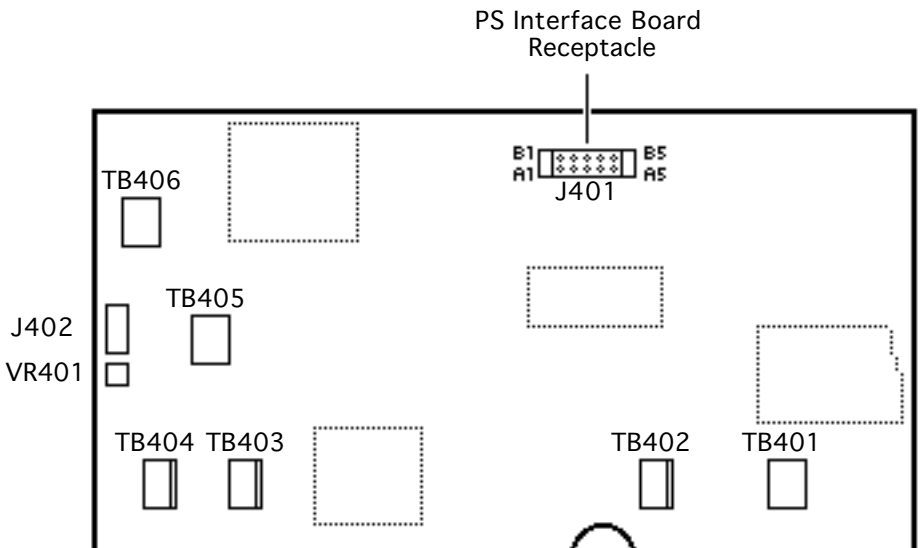



Service Test
Page Button
SW602
SW601
Cover Interlock
Switch
J601
J603
J604
J605
J602
B1
B5
A1
A5
SW603
SW604
SW605
Cassette Size
Microswitches
Pickup Controller Board
J604
J605

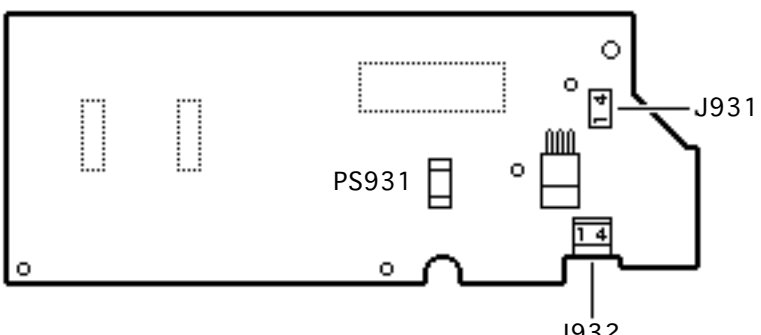
Pickup Sensor Board



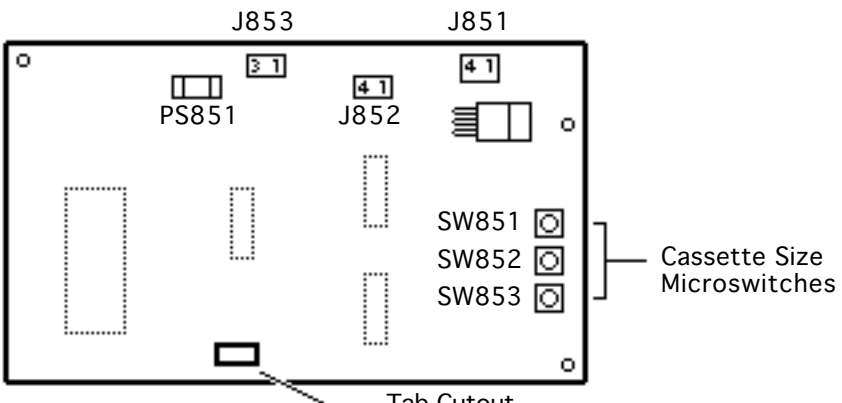
High-Voltage Power Supply



Envelope Feeder
Controller Board

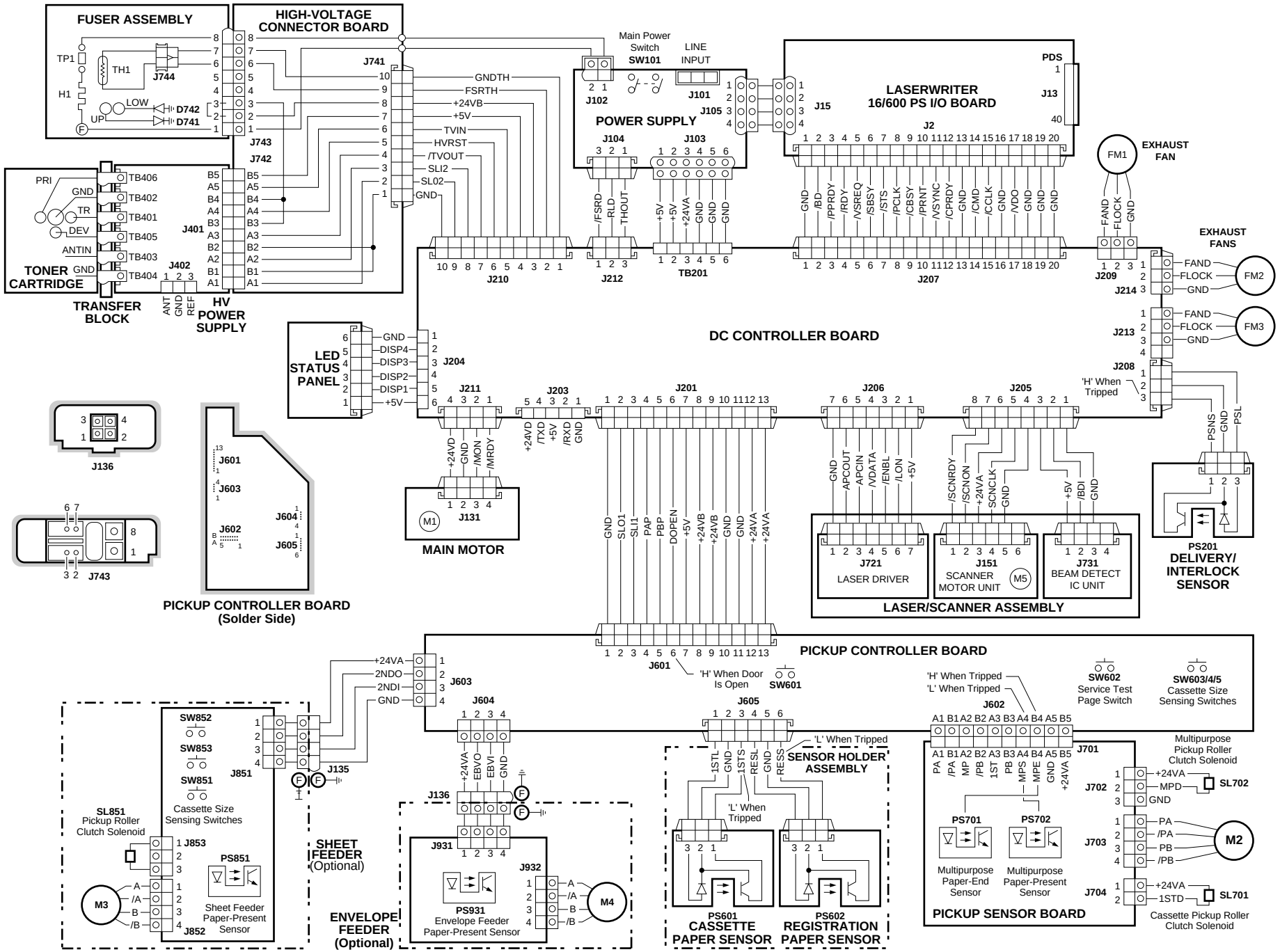


Sheet Feeder
Controller Board



Wiring Diagram

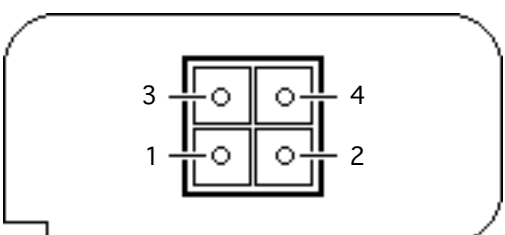
The LaserWriter 16/600 PS wiring diagram can be found on the next page. The detail in this document is too small to read easily at 100% view. You should either zoom into the diagram using the zoom tool above, or print the diagram on a laser printer with a resolution of 300 dpi (600 dpi preferred).


FUSER ASSEMBLY
HIGH-VOLTAGE CONNECTOR BOARD
TP1
TH1
J744
H1
LOW
D742
UP
D741
F
J741
J743
J742
GNDTH
FSRTH
+24VB
+5V
TVIN
HVRST
/TVOUT
SLI2
SL02
GND
Main Power Switch
SW101
LINE INPUT
J102
J101
J105
POWER SUPPLY
J104
J103
PDS
J13
J15
LASERWRITER 16/600 PS I/O BOARD
J2
FM1
EXHAUST FAN
PRI
GND
TR
DEV
ANTIN
GND
TONER CARTRIDGE
TB406
TB402
TB401
TB405
TB403
TB404
J401
J402
TRANSFER BLOCK
ANT
GND
REF
HV POWER SUPPLY
/FSRD
RLD
THOUT
+5V
+5V
+24VA
GND
GND
GND
/BD
/PPRDY
/RDY
/VSREQ
/SBSY
/STS
/PCLK
/CBSY
/PRNT
/VSYNC
/CPRDY
GND
/CMD
/CCLK
GND
/VDO
GND
GND
GND
FAND
FLOCK
GND
J210
J212
TB201
J207
J209
EXHAUST FANS
FM2
J214
FM3
J213
J208
'H' When Tripped
DC CONTROLLER BOARD
LED STATUS PANEL
GND
DISP4
DISP3
DISP2
DISP1
+5V
J204
J211
J203
J201
J206
J205
+24VD
GND
/MON
/MRDY
+24VD
/TXD
+5V
/RXD
GND
GND
SLO1
SLI1
PAP
PBP
DOPEN
+5V
+24VB
+24VB
GND
GND
+24VA
+24VA
GND
APCOUT
APCIN
/VDATA
/ENBL
/LON
+5V
/SCNRDY
/SCNON
+24VA
SCNCLK
GND
+5V
/BDI
GND
PSNS
GND
PSL
J136
J601
J603
J602
J604
J605
J743
J731
BEAM DETECT IC UNIT
PS201
DELIVERY/ INTERLOCK SENSOR
M1
MAIN MOTOR
J131
J721
LASER DRIVER
J151
SCANNER MOTOR UNIT
M5
LASER/SCANNER ASSEMBLY
PICKUP CONTROLLER BOARD (Solder Side)
PICKUP CONTROLLER BOARD
J601
'H' When Door Is Open
SW601
SW602
Service Test Page Switch
SW603/4/5
Cassette Size Sensing Switches
'H' When Tripped
'L' When Tripped
J602
J603
+24VA
2NDO
2NDI
GND
J604
J605
+24VA
EBVO
EBVI
GND
1STL
GND
1STS
RESL
GND
RESS
'L' When Tripped
SENSOR HOLDER ASSEMBLY
J701
PA
/PA
MP
/PB
1ST
PB
MPS
MPE
GND
+24VA
Multipurpose Pickup Roller Clutch Solenoid
J702
+24VA
MPD
GND
SL702
J703
PA
/PA
PB
/PB
M2
J704
+24VA
1STD
SL701
Cassette Pickup Roller Clutch Solenoid
PS701
Multipurpose Paper-End Sensor
PS702
Multipurpose Paper-Present Sensor
PICKUP SENSOR BOARD
J135
SW852
SW853
SW851
Cassette Size Sensing Switches
J851
SL851
Pickup Roller Clutch Solenoid
J853
PS851
M3
A
/A
B
/B
Sheet Feeder Paper-Present Sensor
J852
SHEET FEEDER (Optional)
J931
J932
PS931
Envelope Feeder Paper-Present Sensor
M4
ENVELOPE FEEDER (Optional)
PS601
CASSETTE PAPER SENSOR
PS602
REGISTRATION PAPER SENSOR

Connector J136 Locator

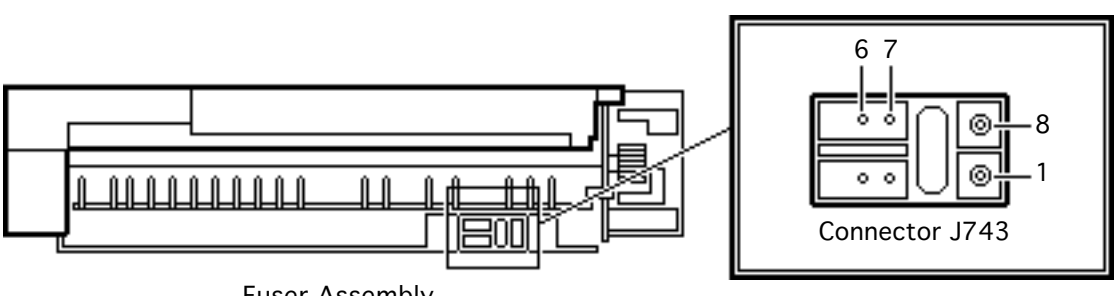
J136 is the connector that the envelope feeder mates into. To see it, open the multipurpose tray and remove the closure panel. The illustration below shows the connector as it appears from the outside of the printer.

A voltage reading of 24V between pins 1 (+24VA) and 4 (GND) during printer startup indicates that motor power is reaching the envelope feeder.



Connector J743 Locator

J743 connects the fuser assembly to the high-voltage connecting block. A measurement of continuity between pins 1 and 8 indicates that the heater bulb and thermoprotector are intact. A measurement of continuity between pins 6 and 7 indicates that the thermistor is intact.



LaserWriter 16/600 PS Troubleshooting Flowchart

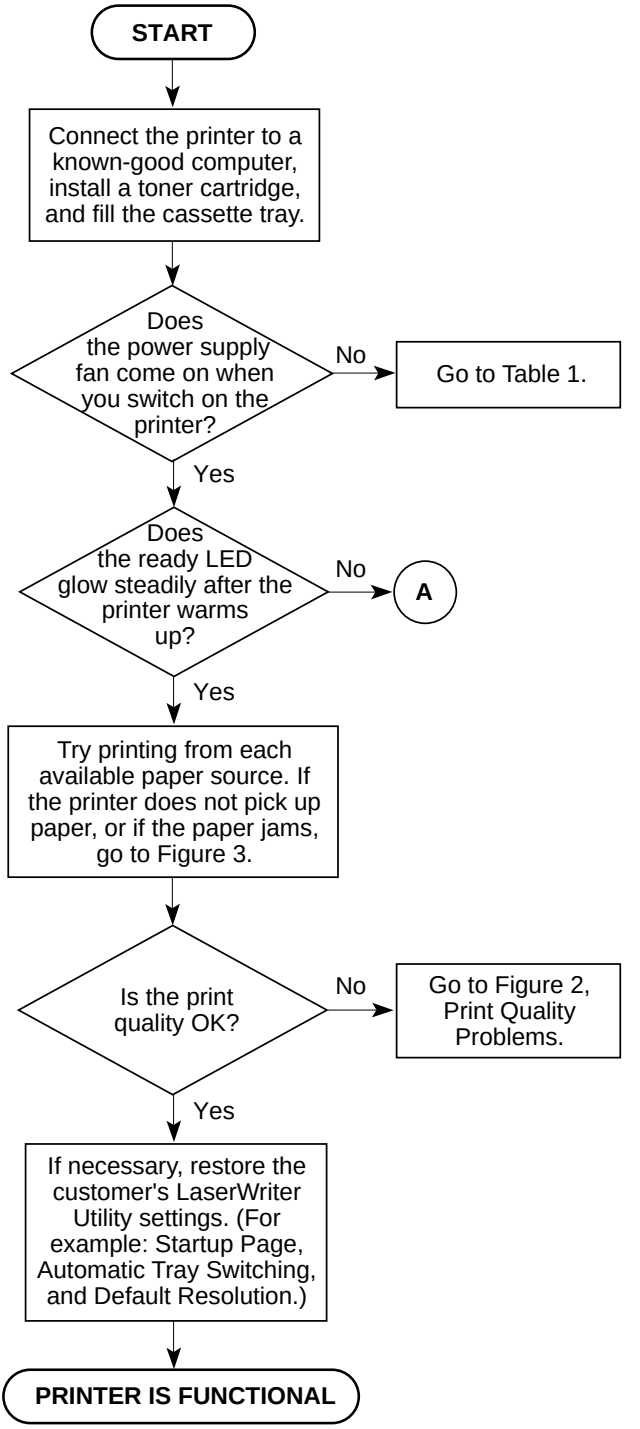

START
Connect the printer to a known-good computer, install a toner cartridge, and fill the cassette tray.
Does the power supply fan come on when you switch on the printer?
No
Go to Table 1.
Yes
Does the ready LED glow steadily after the printer warms up?
No
A
Yes
Try printing from each available paper source. If the printer does not pick up paper, or if the paper jams, go to Figure 3.
Is the print quality OK?
No
Go to Figure 2, Print Quality Problems.
Yes
If necessary, restore the customer's LaserWriter Utility settings. (For example: Startup Page, Automatic Tray Switching, and Default Resolution.)
PRINTER IS FUNCTIONAL

Figure 1. LaserWriter 16/600 PS Print Engine Check (1 of 2)

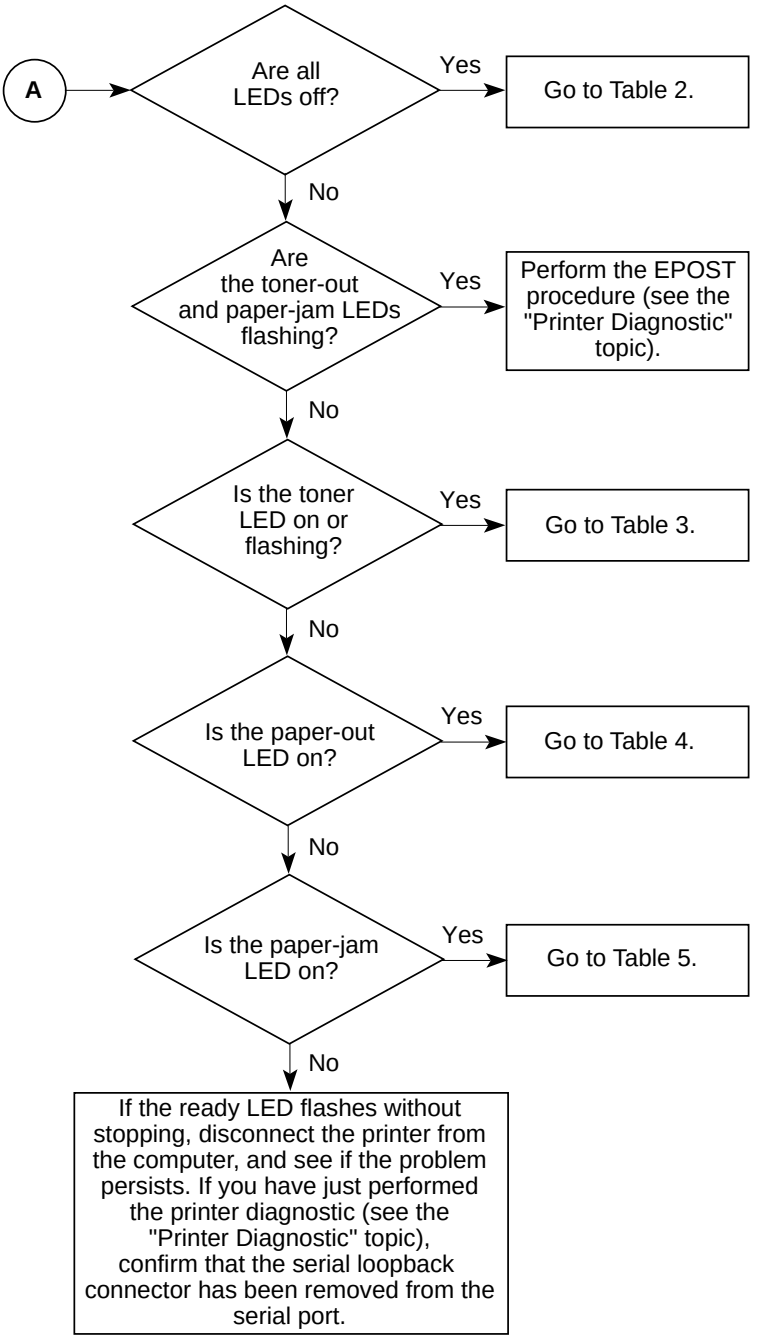

A
Are all LEDs off?
Yes
Go to Table 2.
No
Are the toner-out and paper-jam LEDs flashing?
Yes
Perform the EPOST procedure (see the "Printer Diagnostic" topic).
No
Is the toner LED on or flashing?
Yes
Go to Table 3.
No
Is the paper-out LED on?
Yes
Go to Table 4.
No
Is the paper-jam LED on?
Yes
Go to Table 5.
No
If the ready LED flashes without stopping, disconnect the printer from the computer, and see if the problem persists. If you have just performed the printer diagnostic (see the "Printer Diagnostic" topic), confirm that the serial loopback connector has been removed from the serial port.

Figure 1. LaserWriter 16/600 PS Print Engine Check (2 of 2)

Troubleshooting Tables

Important As you proceed through the steps in a table, remember to retry the printer each time you change its physical state–for example, when you replace a module. If the problem remains, reinstall the original module before proceeding to the next step in the table. Refer as necessary to the wiring diagram that follows the tables**.**

Table 1. The Power Supply Fan Does Not Come On When You Switch On the Printer

Step	Check	Result	Action
1	Does the power supply fan come on when you turn on the printer?	No	Remove the rear panel, I/O board, and I/O shield, and restart the printer.
		Yes	The problem is probably with the power supply fan or its connection to the DC controller board. Run the printer diagnostic. If the diagnostic suggests a fan problem, see Table 9.
2	Do any of the motors rotate after the printer starts up?	Yes	Check the connections at J213 and J214 on the DC controller board, and check that nothing physical is blocking the fan blades. If the problem persists, replace the DC controller board.
		No	Make sure J103 is connected at the power supply. If TB201 is detached from the DC controller, replace the DC controller board; otherwise, replace the power supply. If the problem persists, replace the DC controller board.

Table 2. All LEDs Are Off After Printer Warmup			
Step	**Check**	**Result**	**Action**
1	Are the top cover and fuser door closed?	No	Close them completely, and confirm that the plastic tab actuators on the doors are intact. No LEDs illuminate if either door is open.
2	Remove the rear panel and I/O shield. Is the status panel cable securely connected to J204 on the DC controller board?	No	Secure the cable.
3	Can you print despite the fact no LEDs illuminate?	Yes	Check connection between the status panel and the DC controller board. If the connections are secure, replace the status panel.
4	Place probes between J208-2 (GND) and J208-3 (PSNS) on the DC controller board. Does the voltage rise to 5 V as you open the fuser door?	No	Replace the delivery/interlock assembly.
5	Place probes between J201-7 (+5 V) and J201-1 (GND) on the DC controller board. Switch on the printer. Does the voltage measure 5 V?	No	Replace the DC controller board.
6	Press the top cover interlock leaf spring. Do you hear the clicking sound of a microswitch when you press the spring?	No	Confirm that the black plastic actuator is in place behind the top of the pickup controller board.
7	Remove the paper pickup block and maintain pickup connectivity. Place probes between J601-11 (GND) and J601-7 (+5 V) on the solder side of the pickup controller board. Does the voltage measure 5 V?	Yes No	Replace the pickup controller board. Replace the DC controller-board-to-pickup-controller-board cable.

Table 3. Toner LED Is On or Flashes After Printer Warmup			
Step	**Check**	**Result**	**Action**
1	Try a known-good toner cartridge. Does the problem persist?	No	Problem solved.
2	Have you recently serviced the printer and has this symptom existed ever since?	Yes	You probably did not fully reseat the high-voltage power supply, connector block, or transfer block assembly; or connector J210 on the DC Controller board is not secure. Make sure these modules are securely installed.
3	Have you just performed the engine diagnostic?	Yes	Confirm there is not still a serial loopback connector installed in the serial port.
4	Remove the toner cartridge and inspect all the toner contacts for damage or excess toner buildup. Are the contacts clean and in good condition?	No	Clean or repair the contacts if possible. Take special note of TB403, which is the pronged contact that the toner cartridge mates into. This contact ties into the toner sensor inside the cartridge.
5	Remove the rear panel and I/O shield. Place probes between J210-6 (HVRST) and J210-10 (GND) and switch on the printer. Does the voltage change from 0 to 5 V about one second after the printer starts up?	No Yes	Replace the DC Controller board. Perform the first module exchange below. If the problem persists, reinstall the original module and perform the next exchange: • Replace the HV power supply • Replace the power supply-to-HVPS interface board. • Replace the transfer block assembly. • Replace the DC controller-board-to-HVPS cable.

Table 4. Paper-Out LED is On After Printer Warmup			
Step	**Check**	**Result**	**Action**
1	Is the cassette empty or not installed?	Yes	Make sure that the cassette is present and has paper.
2	Remove the cassette and inspect the paper-sensing lever. Is the lever broken?	Yes	Replace the sensor holder assembly.
3	Defeat the cassette paper sensing lever by pushing it and holding it in (as if a cassette were present). With your other hand, press the three microswitch leaf springs all at the same time. Does the ready LED illuminate after a couple of seconds?	Yes	Replace the pickup controller board.
4	Remove the rear panel and I/O shield. Place probes between J201-7 (+5 V) and J201-1 (GND) on the DC controller board. Switch on the printer. Does the voltage measure 5 V?	No	Replace the DC controller board.
5	Remove the paper pickup block and maintain pickup connectivity. Place probes between J601-11 (GND) and J601-7 (+5 V) on the solder side of the pickup controller board. Does voltage measure 5 V?	No	Replace the DC-controller-to-pickup-controller cable.
6	Measure the voltage between J605-5 (GND) and J605-3 (1STS). Does the voltage measure 5 V?	No	Replace the pickup controller board.
7	Keep the probes in the same position and manually trip the cassette sensor lever. Does the voltage drop to 0 V when you trip the lever?	No Yes	Replace the sensor holder assembly. Replace the pickup controller board.

Table 5. Paper-Jam LED is On After Printer Warmup			
Step	**Check**	**Result**	**Action**
1	Is the delivery/interlock sensor snagged?	Yes	Remove the top cover and delivery roller assembly, and unsnag the sensor spring. The spring should be straight. If the actuator is snagged, it will not spring back and forth as you try to trip it.
2	Is the delivery-sensing lever snagged?	Yes	Remove the top cover and delivery roller assembly and see what is snagging the lever. If necessary, remove and dismantle the fuser assembly and replace the delivery-sensing lever.
3	Is the registration-sensing lever snagged?	Yes	If the lever is broken or snagged, remove the pickup block and troubleshoot further. If necessary, replace the sensor holder assembly.
4	Remove the rear panel, I/O shield, top cover, and delivery roller assembly. Is the purple cable between the delivery/interlock sensor and the DC controller board securely connected?	No	Secure the cable.
5	Place probes between J208-2 (GND) and J208-3 (PSNS). Does the voltage rise to 5 V as you open the fuser door?	No	Replace the delivery/interlock assembly.
6	Place probes between J201-7 (+5 V) and J201-1 (GRD) on the DC controller board. Does the voltage measure 5 V?	No	Replace the DC controller board.

Table 5. Paper-Jam LED is On After Printer Warmup (Continued)			
Step	**Check**	**Result**	**Action**
7	Remove the paper pickup block and maintain pickup connectivity. Place probes between J601-7 (+5 V) and J601-11 (GND) on the solder-side of the pickup controller board. Does the voltage measure 5 V?	No	Replace the DC-controller board-to-pickup-controller-board cable.
8	Place probes between J605-6 (RESS) and J605-5 (GND). Does the voltage measure 5 V?	No	Replace the pickup controller board.
9	Keep the probes in the same position and manually trip the registration sensor lever. Does the voltage drop to 0 V when you trip the lever?	No Yes	Replace the sensor holder assembly. Replace the DC controller board.

Important When there is a failure of the fusing system, the DC controller board shuts off current to the fuser roller heater and charges capacitor C208 on the DC controller board to prevent overheating. If there is a failure of the fusing system, you must turn off the power and leave it off for about 10 minutes, or manually discharge the capacitor before switching power back on.

Table 6. Fuser Assembly Error			
Step	**Check**	**Result**	**Action**
1	Remove the rear panel, I/O board, and I/O shield. Is connector J210 on the DC controller board secure?	No	Secure the connector.
2	Is the power supply firmly seated?	No	Seat the power supply.

Table 6. Fuser Assembly Error (Continued)			
Step	**Check**	**Result**	**Action**
3	Remove the fuser assembly and let it cool. Measure the resistance between J743-6 and J743-7 on the fuser. (Refer to the wiring diagram for illustration and pin layout of connector J743.) Does the resistance measure between 180 and 280 kΩ?	No	Disconnect J744 and check for same resistance. Replace the thermistor or the connector cable, as needed.
4	Measure the resistance between J743-1 and J743-8 on the fuser. Does the resistance measure approximately 3 Ω or less?	No	If there is continuity through the heater bulb, replace the heater bulb. If there is continuity across the thermoprotector, replace the fuser connector cable. If there is not continuity across the thermoprotector replace the thermoprotector, and proceed to the next step.
5	Reinstall the fuser. Place probes between J212-1 (/FSRD) and TB201-6 (GND) on the DC controller board. Does the voltage change from approximately 5.1 V to 1.5 V a few seconds after the printer starts up?	No	Replace the DC controller board.
6	Place probes between J212-2 (RLD) and TB201-6 (GND). Does the voltage measure approximately 2.1 V?	No Yes	Replace the DC controller board. Replace the power supply.

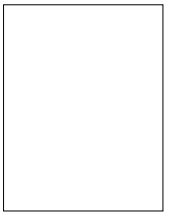
Table 7. Laser/Scanner Error			
Step	**Check**	**Result**	**Action**
1	Remove the rear panel and I/O shield. Are the DC controller board connectors J205 and J206 secure?	No	Secure the cables.
2	Remove the top cover and delivery roller assembly. Are all three laser/scanner assembly connectors secure?	No	Secure the cables.
3	Remove the two cables that run from the DC controller board to the laser/scanner assembly and check the resistance of each. Is the resistance approximately 1 ohm or less for each wire?	No Yes	Replace the defective cable. Replace the laser/scanner assembly. If the problem persists, reinstall the original module and replace the DC controller board.

Table 8. Main Motor Error			
Step	**Check**	**Result**	**Action**
1	Remove the rear panel and I/O shield. Is the main motor cable secure at J211 on the DC controller board?	No Yes	Secure the cable. Perform the first module exchange listed below. If the problem persists, reinstall the original module and perform the next exchange: • Replace the main motor. • Replace the DC controller board. • Replace the main motor cable.

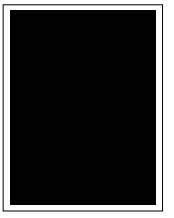
Table 9. Fan Error			
Step	**Check**	**Result**	**Action**
1	Remove the rear panel and I/O shield. Are the fan cables secure at J209, J214, and J213 on the DC controller board?	No	Secure the cables.
2	Observe fan operation of FM1 (power supply fan), FM2 (controller board fan), and FM3 (internal fan). FM1 and FM2 exhaust outward through the vents in the external plastics. FM3 vents internally and runs only during a print cycle, so you'll have to remove the top cover and defeat sensors to observe it. Are all the fans operating correctly?	No	Check power distribution to each fan by placing multimeter probes between pin 1 (fan drive) and pin 3 (ground) at the DC controller connector for that fan and restart the printer. FM1: connector J209 FM2: connector J214 FM3: connector J213 FM1, FM2, and FM3 should go from 0 V to 24 V then down to about 16 V. If any of these does not behave in this manner: • Replace the DC controller board. • Replace the power supply. • Replace any faulty fan.
3	Place the probes at J209-2 (FLOCK) and J209-3 (GND) on the DC controller board, and switch on the power. Does the voltage measure 2.2 V or more?	Yes No	Replace the power supply fan (FM1). Replace the DC controller board.

Table 10. I/O Board Error			
Step	**Check**	**Result**	**Action**
1	Do the diagnostic LEDs indicate an I/O board error?	Yes	Replace the I/O board.
2	Did you receive a SIMM error?	Yes	Replace the faulty SIMM.
3	Did you receive a ROM error?	Yes	Replace the I/O board.

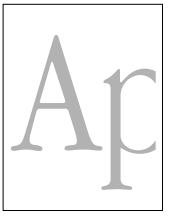
The following graphic shows examples of image quality defects. Refer to theappropriate troubleshooting table to correct the quality of the image.



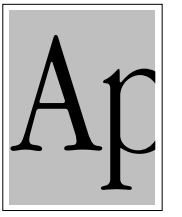
All-Blank Page
See Table 11



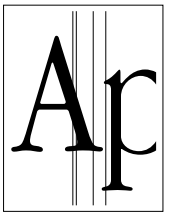
All-Black Page
See Table 12



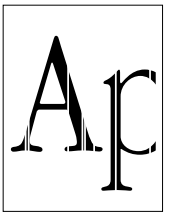
Light/Faded Image
See Table 13



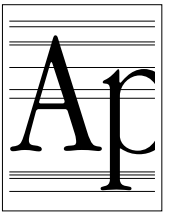
Dark Image
See Table 14



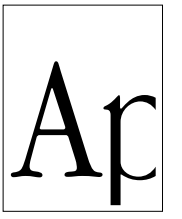
Black Vertical Line(s)
See Table 15



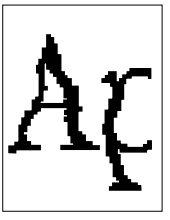
White Vertical Line(s)
See Table 16



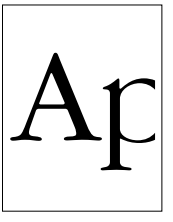
Black Horizontal Lines
See Table 17



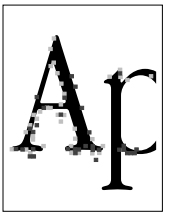
Bad Registration
See Table 18



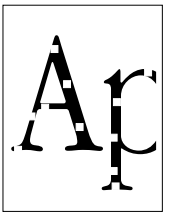
Stair-stepping
See Table 19



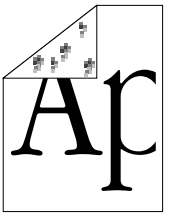
Vertical Distortion
See Table 20



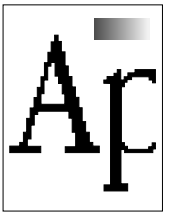
Bad Fusing
See Table 21



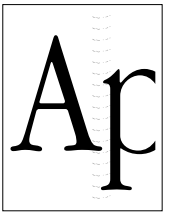
Blank Spots
See Table 22



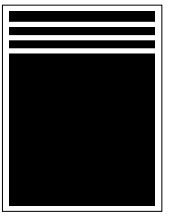
Toner on Back
See Table 23



Cannot Print in PhotoGrade
See Table 24



Repetitive Defects
See Table 25



White Horizontal Stripes
See Table 7

Figure 2. Print Quality Problems

Table 11. All-Blank Page			
Step	**Check**	**Result**	**Action**
1	Is the sealing tape removed from the toner cartridge?	No	Remove the sealing tape.
2	Have you recently installed a laser/scanner unit and has this symptom existed since?	Yes	The laser shutter may have been installed incorrectly. The shutter should spring back and forth as you insert the toner cartridge.
3	Does this symptom occur only with envelopes?	Yes	Instruct the customer to adjust margins in the software application.
4	Run the Extended Power-On Self Test. Does the test indicate a specific error?	Yes	Go to the appropriate troubleshooting table that describes the error indicated.
5	Remove the rear panel and I/O shield. Place probes between J210-6 (HVRST) and J210-10 (GND). Does the voltage change from 0 to 5 V about one second after the printer starts up?	No	Replace the DC controller board.
6	Place probes between J210-9 (SLO2) and J2 10-10 (GND). Does the voltage measure approximately 0.7 V about one second after the main motor starts?	No Yes	Replace the DC controller board. Perform the first module exchange listed below. If the problem persists, reinstall the original module and perform the next exchange: • Replace the high-voltage power supply. • Replace the power-supply-to-HVPS interface board. • Replace the transfer block assembly.

Table 12. All-Black page			
Step	**Check**	**Result**	**Action**
1	Run the Extended Power-On Self Test (see “Printer Diagnostics”). Does the test indicate a specific error?	Yes	Go to the appropriate troubleshooting table that describes the error indicated.
2	Place probes between J210-9 (SLO2) and J210-10 (GND). Does the voltage measure approximately 0.7 V about one second after the main motor starts?	No Yes	Replace the DC controller board. Perform the first module exchange listed below. If the problem persists, reinstall the original module and perform the next exchange: • Replace the high-voltage power supply. • Replace the power-supply-to-HVPS interface board.

Table 13. Uniformly Light/Faded Image Over Entire Page			
Step	**Check**	**Result**	**Action**
1	Adjust the density using the Printer Utility. Does the problem persist?	No	Problem solved.
2	Try printing with known-good paper. Does the problem persist?	No	Problem solved.
3	Replace the transfer roller with a known-good transfer roller. Does the problem persist?	No	Problem solved.
4	Have you recently serviced the printer and has this symptom existed ever since?	Yes	Confirm that the high-voltage power supply is installed correctly and that good contact is being made with the transfer block assembly.
5	Remove the rear panel and I/O shield. Place probes between J210-9 (SLO2) and J210-10 (GND) and switch on the printer. Does the voltage read about 0.7 V about one second after the main motor starts?	No Yes	Replace the DC controller. Replace the high-voltage power supply. If the problem persists, replace the high-voltage connector board.

Table 14. Uniformly Dark Image Over Entire Page			
Step	**Check**	**Result**	**Action**
1	Adjust the density using the Printer Utility. Does the problem persist?	No	Problem solved.
2	Try printing with known-good paper. Does the problem persist?	No	Problem solved.
3	Clean the printer drum grounding contact and cartridge contact and print a test page. Does the problem persist?	No	Problem solved.
4	Remove the rear panel and I/O shield. Place probes between J210-6 (HVRST) and J210-10 (GND). Does the voltage change from 0 to 5 V about one second after the printer starts up?	No Yes	Replace the DC controller board. Replace the high-voltage power supply. If the problem persists, replace the high-voltage connector board.

Table 15. Black Vertical Lines, Sharp and Well-Defined			
Step	**Check**	**Result**	**Action**
1	Try a known-good toner cartridge. Does the problem persist?	No	Problem solved.
2	Does the symptom occur on a service test page?	No Yes	Replace the I/O board. Replace the fuser assembly. If the problem persists, replace the laser/scanner assembly.

Table 16. White Vertical Lines, Sharp and Well-Defined			
Step	**Check**	**Result**	**Action**
1	Try a known-good toner cartridge. Does the problem persist?	No	Problem solved.
2	Is there a hair or other obstruction that can be blocking the laser beam?	Yes	Remove the obstruction.
3	Does the symptom appear on the service test page?	No Yes	Replace the I/O board. Replace the laser/scanner assembly.

Table 17. Black Horizontal LIne, Sharp and Well-Defined			
Step	**Check**	**Result**	**Action**
1	Try a known-good toner cartridge. Does the problem persist?	No	Problem solved.
2	Does the symptom appear on the service test page?	No Yes	Replace the I/O board. Replace the laser/scanner assembly.

Table 18. Bad Registration/Image Cut Off			
Step	**Check**	**Result**	**Action**
1	Try printing with less paper at the source. Does the problem persist?	No	Problem solved.
2	Run a print from a different paper source. Does the problem persist?	No	Replace or reinstall the faulty pickup roller.
3	Perform the registration adjustment (see ”Registration Adjustment” in this chapter). Does the problem persist?	No Yes	Problem solved. Replace the sensor holder assembly.

Table 19. Stairstepping/Vertical Lines Jagged or Shaky			
Step	**Check**	**Result**	**Action**
1	Run a service test page. Does the problem persist?	No	Replace the I/O board.
2	Run the Extended Power-On Self Test (see “Printer Diagnostics”). Does the test indicate a specific error?	Yes No	Go to the appropriate troubleshooting table that describes the error indicated. Replace the laser/scanner assembly. If the problem persists, replace the DC controller board.

Table 20. Vertical Elongation or Foreshortening			
Step	**Check**	**Result**	**Action**
1	Run the Extended Power-On Self Test (see “Printer Diagnostics”). Does the test indicate a specific error?	Yes No	Go to the appropriate troubleshooting table that describes the error indicated. Perform the first module exchange listed below. If the problem persists, reinstall the original module and perform the next exchange: • Replace the laser/scanner assembly. • Replace the DC controller board. • Replace the main motor.

Table 21. Bad Fusing			
Step	**Check**	**Result**	**Action**
1	Are the fuser roller levers in a down (print-mode) position?	No Yes	Set the envelope levers to a down (print-mode) position. Go to Table 6, Fuser Assembly Error.

Table 22. Blank Spots/Random Pattern or Location			
Step	**Check**	**Result**	**Action**
1	Try printing with known-good paper. Does the problem persist?	No	Problem solved.
2	Are humidity conditions according to specifications?	No	Inform the customer of the changes that are necessary.
3	Are you printing on the correct side of the paper?	No Yes	Turn over the paper. Go to Table 21, Bad Fusing.

Table 23. Toner on Back of Page			
Step	**Check**	**Result**	**Action**
1	Is the toner smudge in a small area behind the upper-left corner of the page?	Yes No	Clean or replace the pickup roller. Clean with a dry, lint-free cloth or replace the transfer roller, transfer guide assembly, or lower fuser roller.

Table 24. Cannot Print in PhotoGrade			
Step	**Check**	**Result**	**Action**
1	Have you upgraded printer memory to 12 MB of RAM?	No	You must have a minimum of 12 MB of RAM to run PhotoGrade at 600 dpi.

Table 25. Repetitive Defects			
Step	**Check**	**Result**	**Action**
1	Try a known-good toner cartridge. Does the problem persist?	No	Problem solved.
2	Does the symptom occur on a service test page?	No	Replace the I/O board.
3	Is the repetitive staining along the left edge of the paper?	Yes	Clean the feeder rollers with a dry, lint-free cloth.
4	Interrupt a print cycle (see “Interrupting a Print Cycle” under “Troubleshooting Tips”). Is the symptom present on the drum?	Yes No	Clean or replace the pickup/transfer rollers and guides as required. Clean or replace the fuser or delivery rollers.

Table 26. Picking Up From Wrong Source			
Step	**Check**	**Result**	**Action**
1	Is the selected paper source empty?	Yes	Select Paper Handling in the Apple Printer Utility and disable the Tray Switching option if you do not want paper to feed from a secondary source when the selected source is empty.
		No	There is a problem in the sensing system. Make sure that automatic tray switching is off and try printing again. If there are jam or pickup problems at that point, refer to Figure 3.

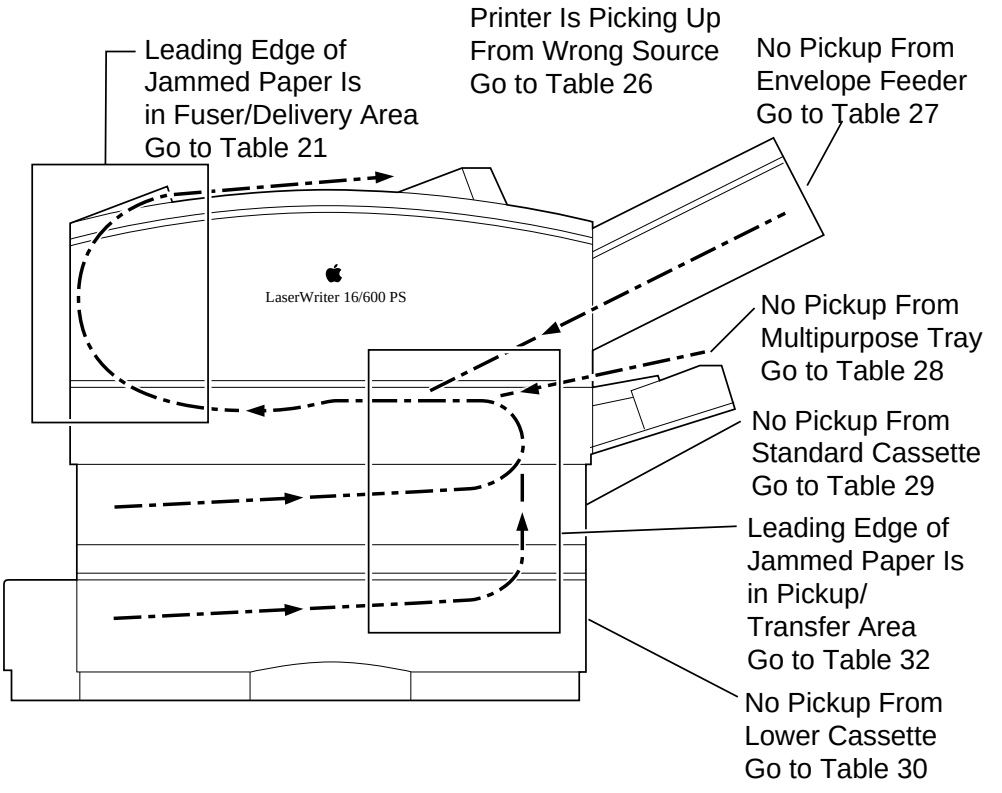

Leading Edge of Jammed Paper Is in Fuser/Delivery Area Go to Table 21
Printer Is Picking Up From Wrong Source Go to Table 26
No Pickup From Envelope Feeder Go to Table 27
LaserWriter 16/600 PS
No Pickup From Multipurpose Tray Go to Table 28
No Pickup From Standard Cassette Go to Table 29
Leading Edge of Jammed Paper Is in Pickup/ Transfer Area Go to Table 32
No Pickup From Lower Cassette Go to Table 30

Figure 3. Paper Transport Problems

Table 27. No Pickup From Envelope Feeder			
Step	**Check**	**Result**	**Action**
1	Is paper picking up correctly from the standard cassette?	No	Go to Table 29.
2	Remove the left, right, and bottom covers of the envelope feeder and install the feeder into the pickup block. Do the envelope feeder motor and gearing engage after you restart?	Yes	Remove the paper pickup block from the printer and maintain pickup connectivity (see “Troubleshooting Tips” in this chapter).
3	Place probes on the solder side of the pickup controller board between J603-4 (GND) and the power supply side of diode D606. Does the voltage measure 5 V?	No Yes	Replace the pickup controller board. Perform the first module exchange below. If the problem persists, reinstall the original module and perform the next exchange: • Replace the envelope feeder controller board. • Replace the printer interface cable in the envelope feeder. • Replace the feeder interface cable in the pickup block.
4	Measure the voltage between J604-4 (GND) and J604-1 (+24 V). Does the voltage measure 24 V?	No	Replace the pickup controller board.
5	Place probes between J136-1 (+24 V) and J136-4 (GND) on the receptacle that the envelope feeder plugs into. Does the voltage measure 24 V?	No Yes	Replace the feeder interface cable. Perform the first module exchange below. If the problem persists, reinstall the original module and perform the next exchange: • Replace the envelope feeder controller board. • Replace the envelope feeder motor. • Replace the printer interface cable inside the envelope feeder.

Table 28. No Pickup From Multipurpose Tray			
Step	**Check**	**Result**	**Action**
1	Is paper picking up correctly from the standard cassette?	No	Go to Table 29
2	Maintain I/O connectivity (see “Troubleshooting Tips” in this chapter). Do the pickup motor and gearing engage after you try printing to the multipurpose tray?	No	Remove the rear panel and the right corner panel and check that all the following connectors are secure: • DC controller board connector J201 • Pickup controller board connector J601 • Pickup block motor cable J703
3	Remove the paper pickup block and maintain pickup connectivity (see “Troubleshooting Tips” in this chapter). Closely observe the gear at the end of the pickup block and restart the printer. Do all gears rotate correctly after you restart?	No	Remount or replace the problem gear(s).
4	Select the multipurpose tray as paper source, and print something. Does the multipurpose pickup gear rotate?	No	Make sure that the pickup gear and its spring and hook are installed correctly. If the problem persists, replace the multipurpose pickup solenoid.
5	The problem is mechanical and is caused by failure of one of these components. Restart the printer and attempt another print job. Observe the components closely. Does the symptom persist?	Yes	Remount, clear, or replace the defective component.

Table 29. No Pickup From Standard Cassette			
Step	**Check**	**Result**	**Action**
1	Initiate a service test page. Does the printer pickup from the standard cassette?	Yes	Confirm that I/O cable connections are secure and that configuration settings are correct. To make certain that networking or CPU software is not the root problem, confirm through the printer utility that the startup page is enabled, and restart the printer. If the startup page prints, there is a software or networking problem away from the printer. If the startup page does not print, replace the I/O board.
2	Do the pickup motor and gearing engage after you restart the printer?	Yes	Remove the paper pickup block and maintain pickup connectivity. Closely observe the gear end of the pickup block and restart the printer. All but three ratchet gears should spin freely during the startup sequence. If the problem persists, remount or replace the problem gear(s).
3	Remove the rear panel and the right corner panel. Is the pickup controller board cable securely connected to J201 on the DC controller board?	No	Secure the cable.
4	Is the DC controller board cable securely connected to J601 on the pickup controller board?	No	Secure the cable.
5	Is the pickup block motor cable securely connected at J703 on the pickup sensor board?	No	Secure the cable.

Table 29. No Pickup From Standard Cassette (Continued)			
Step	**Check**	**Result**	**Action**
6	Disconnect J201 on the DC controller board. Place probes between pins J201-1 (GND) and J201-13 (+24 V) on the male connector on the board. Does the voltage measure 24 V?	No Yes	Replace the DC controller board. Replace the pickup-to-DC controller board cable.
7	Place probes between pins J201-1 (GND) and J201-7 (+5 V) on the male connector on the board. Does the voltage measure 5 V?	No	Replace the DC controller board.
8	Reconnect J201. Remove the paper pickup block and maintain pickup connectivity. Measure the voltage between J601-11 (GND) and J601-13 (+24 V) on the pickup controller board. Does the voltage measure 24 V?	No	Replace the pickup-controller-to-DC-controller-board cable.
9	Place probes between pins J601-1 (GND) and J601-7 (+5 V). Does the voltage measure 5 V?	No	Replace the pickup-controller-to-DC-controller-board cable.
10	Place probes between pins J601-1 (GND) and J601-9 (+24 V). Does the voltage measure 24 V?	No Yes	Replace the pickup controller board. Perform the first module exchange below. If the problem persists, reinstall the original module and perform the next exchange: • Replace the pickup motor. • Replace the pickup sensor board.

Table 30. No Pickup From Lower Cassette			
Step	**Check**	**Result**	**Action**
1	Is paper picking up correctly from the standard cassette?	No	Go to Table 29.
2	Disable the startup test page, and remove the top cover, rear panel, and right corner panel from the printer. Disconnect J603 from the exposed edge of the controller board and connect a spare sheet feeder interface cable. Plug the opposite end of the interface cable into the sheet feeder receptacle. Is paper now picked up from the lower cassette?	Yes	Replace the sheet feeder interface cable.
3	Reinstall the sheet feeder and restart the printer. Do the sheet feeder gearing and motor rotate?	No	Confirm that the sensing arm is intact and that the lower cassette is installed. Check that the following connectors are secure: • Connector J201 on the DC controller board. • The two connectors at the edge of the pickup controller board. • The three connectors at the edge of the sheet feeder controller board.
4	Switch off the printer and remove the 4-pin cable from connector J603 along the front edge of the pickup controller board. Place probes between J603-1 (+24 V) and J603-4 (GND) on the pickup controller board. Does the voltage measure 24 V when you switch on the printer?	No Yes	Replace the pickup controller board. Perform the first module exchange listed below. If the problem still persists, reinstall the original module and perform the next exchange. • Replace the sheet feeder controller board. • Replace the sheet feeder controller block. • Replace the sheet feeder motor.

Table 30. No Pickup From Lower Cassette (Continued)			
Step	**Check**	**Result**	**Action**
5	Remove the paper pickup block and maintain pickup connectivity (see “Troubleshooting Tips” in this chapter). Place probes on the solder side of the pickup controller board on J603-4 (GND) and the power supply side of diode D606. Does the voltage measure 5 V when you switch on the printer?	Yes	Perform the first module exchange listed below. If the problem still persists, reinstall the original module and perform the next exchange. • Replace the sheet feeder controller board. • Replace the sheet feeder pickup solenoid. • Replace the sheet feeder controller block. • Remount and/or replace the pickup shaft gear and roller.
6	Place probes between pins J201-1 (GND) and J201-7 (+5 V) on the DC controller board. Does the voltage measure 5 V?	No Yes	Perform the first module exchange listed below. If the problem still persists, reinstall the original module and perform the next exchange. • Replace the I/O board • Replace the DC controller board. Replace the pickup controller board.

Table 31. Leading Edge of Jammed Paper Is in Fuser/Delivery Area

Step	Check	Result	Action
1	Do the delivery rollers turn when you start up the printer?	No	Go to Step 6.
2	Is there crumpled paper just outside the exit point of the fuser assembly?	Yes	A snagged sensing lever is probably the cause of the problem. Remove the top cover and delivery roller assembly, and inspect the delivery/interlock sensor. If the delivery-sensing lever is broken, replace it.
3	Is there an accordian-style jamming just short of the paper delivery tray?	Yes	The delivery guide pins might have been installed incorrectly. These are the four small pins on the delivery roller assembly. They should point outward, with the flow of paper.
4	Does jamming occur only when paper feeds from the multipurpose tray?	Yes	Inspect the sensing lever for multipurpose paper-end sensor PS701. Unsnag or replace it if it is damaged.
5	Remove the rear panel and I/O shield. Place probes betweenJ208-2 (GND) and J208-3 (PSNS) on the DC controller board. Does the voltage rise from 0 to 5 V as you open the fuser access door?	Yes No	Replace the DC controller board. Replace the delivery/interlock sensor.
6	Remove the rear panel and I/O shield. Restart the printer and observe the main motor. Does the main motor spin when the printer starts up?	Yes	Trace mechanical drive components from the delivery rollers back to the main motor, taking special note of the delivery drive belt. Clean or replace parts as necessary.
7	Make sure that the main motor is secure at J211 on the DC controller board, then run the Extended Power-On Self Test. Does the diagnostic indicate a main motor error?	Yes No	Go to Table 8. Check main motor drive components for binding or improper installation. Clean or replace parts as required.

Table 32. Leading Edge of Jammed Paper Is in Pickup/Transfer Area			
Step	**Check**	**Result**	**Action**
1	Try printing with known-good paper. Does the problem persist?	No	Problem solved.
2	Try feeding the paper from one of the other paper sources. Does jamming still occur?	No	Go to Table 33, 34, 35, or 36, as applicable.
3	Remove the toner cartridge, hold the green knob, and lift the delivery guide. Does the registration sensor arm move back and forth freely when you flick it with your finger?	No	Clear it if possible. If the arm is snagged beyond repair, replace the sensor holder assembly.
4	Check for obstructions, especially beneath the upper guide plate situated between the pickup block and the transfer roller. Are there obstructions?	Yes	Clear the obstructions.
5	Is the trailing edge of the jammed paper about an inch short of the registration sensor arm?	Yes	If paper has jammed there, especially if there is no sign of crumpling, there is almost certainly a failure in the delivery sensing system. Go to Table 31.
6	Remove the paper pickup block from the printer and maintain pickup connectivity. You will be taking measurements from the solder side of the pickup controller board. Place probes between J605-5 (GND) and J605-6 (RESS) and manually trip the registration sensor arm. Does the voltage measure about 5 V (normal) and 0 V (tripped)?	Yes No	Replace the pickup controller board. Replace the sensor holder assembly.

Table 33. Paper Jams in Pickup/Transfer Area When Feeding From the Standard Cassette

Step	Check	Result	Action
1	Is the black ribbed paper guide firmly seated?	No	Reseat the black ribbed paper guide. If this guide is damaged or unseated, paper may jam at the entrance to the paper pickup block.
2	Is the white passive roller on the cassette OK?	No	Clean the roller so that it forms a smooth gripping surface against the lower feed roller.
3	Is the lower feed roller OK?	No	Replace or reinstall the lower feed roller and/or its gearing. Note that the upper feed rollers serve other paper sources, so they are not likely to be the cause of the problem.

Table 34. Paper Jams in Pickup/Transfer Area When Feeding From the Multipurpose Tray

Step	Check	Result	Action
1	Try printing with known-good paper. Does the problem persist?	No	Problem solved.
2	Is the multipurpose tray width guide set correctly?	No	Set the guide so that it is snug against the edge of the paper.
3	Is the multipurpose pickup roller slipping when it tries to pull in the paper?	Yes	Reinstall or replace the multipurpose pickup roller. If you have recently taken apart the pickup block gearing and paper has not fed successfully since then, the problem could be incorrect installation of the gears.
4	Are there two sheets at the jam location?	Yes	Replace the multipurpose tray guide assembly.

Table 35. Paper Jams in Pickup/Transfer Area When Feeding From the Optional Sheet Feeder

Step	Check	Result	Action
1	Is the black ribbed paper guide firmly seated?	No	Reseat the black ribbed paper guide. If this guide is damaged or unseated, paper may jam at the entrance to the paper pickup block.
2	Is the standard 250-sheet cassette installed and in good condition?	No	Paper fed from the sheet feeder passes through the slit in the standard cassette located 2 inches back from the face plate. Make sure the standard cassette is fully inserted and that no blockage exists in this opening.
3	Are the feeder rollers in the sheet feeder OK?	No	The sheet feeder has one primary and two passive feeder rollers. Because power is reaching the pickup roller, any problem would probably be with binding or obstruction in the roller/gear system. Perform the sheet feeder bypass procedure and observe the functioning of the feeder components (see *Service Source CD* for additional information).

Table 36. Paper Jams in Pickup/Transfer Area When Feeding From the Envelope Feeder

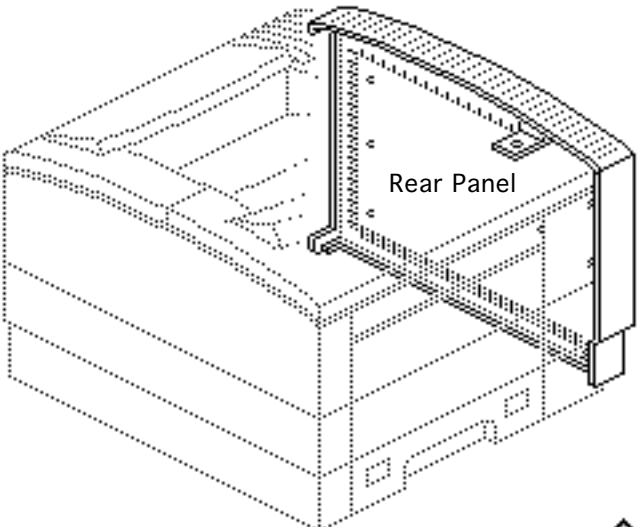
Step	Check	Result	Action
1	Is the envelope feeder width guide set correctly?	No	Set the guide so that it is snug against the edge of the envelopes.
2	Is the envelope feeder correctly installed into the printer?	No	Reinstall the feeder so that it is mounted solidly onto the black positioning pin in the upper-left corner of the pickup block opening. If the feeder isn't mounted correctly, or if the pin is damaged, the pickup block entrance may not align properly.
3	Have you recently taken the feeder apart and has it exhibited this problem since then?	Yes	You may not have reinstalled the gear/roller system correctly. Refer to *Service Source CD* for more information.
4	Is the fork-shaped separation guide installed correctly?	No	There should be a 1.5 mm opening between the separation guide and the primary feed roller. Refer to the Adjustments chapter in the LW 16/600 PS Envelope Feeder manual on *Service Source CD* for more information.

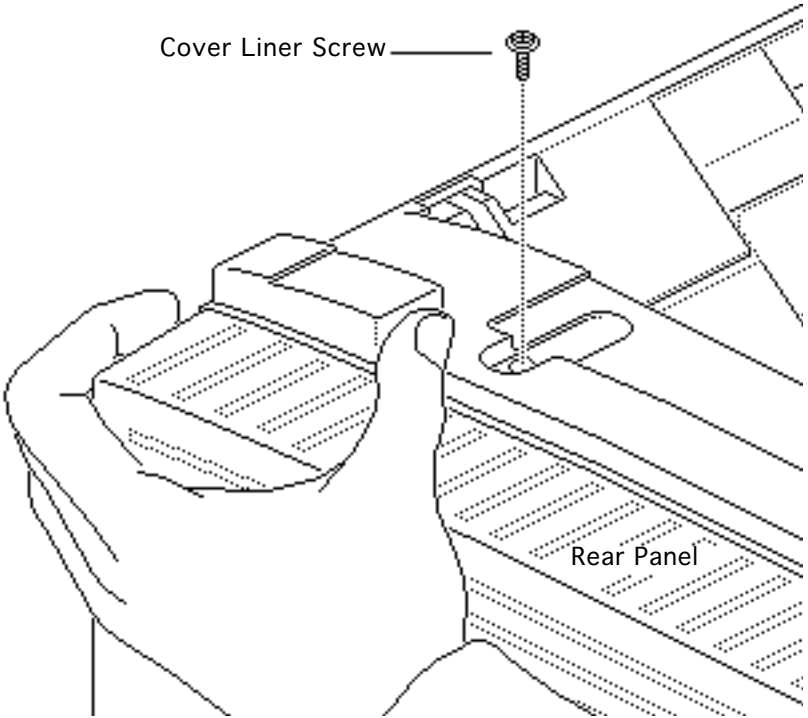
Take Apart

LaserWriter 16/600 PS

Rear Panel

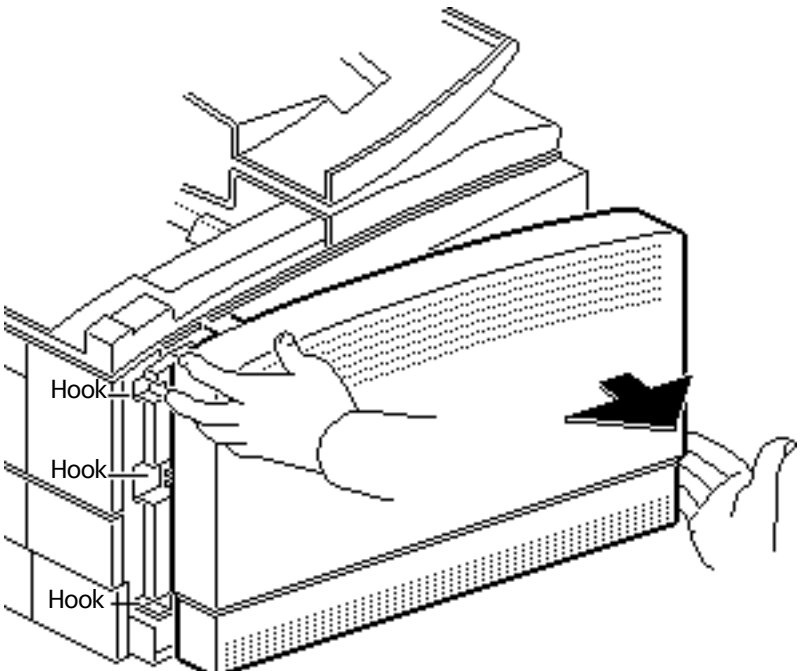
No preliminary steps are required before you begin this procedure.





1 Open the toner access cover and remove the cover liner screw.

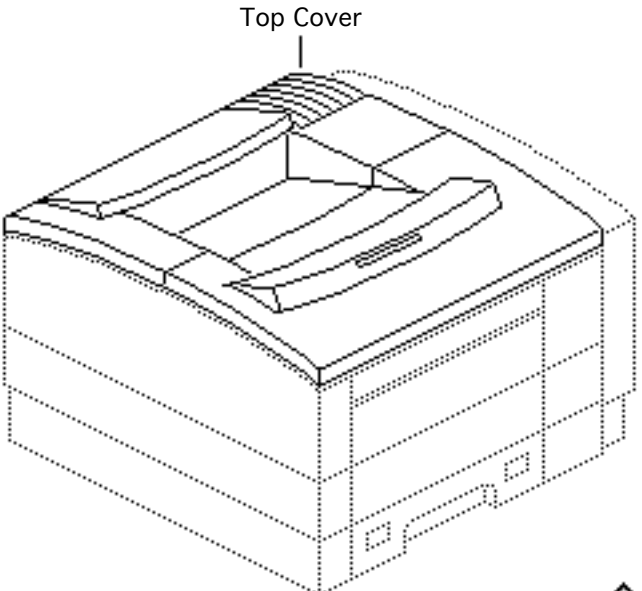
2 Grip the upper corner of the rear panel with your left hand as shown.



3 Place your right fingertips on the I/O-label end of the rear panel, swing the panel outwards, and remove the panel from the printer.

Replacement Note: Angle the three hooks in the rear panel into the openings in the right rear panel. Then swing the rear panel closed, being sure to slide the tab beneath the cover liner. If the cover liner screw hole does not line

up, gently strike the I/O-label end of the panel with the base of your palm to position the panel properly.

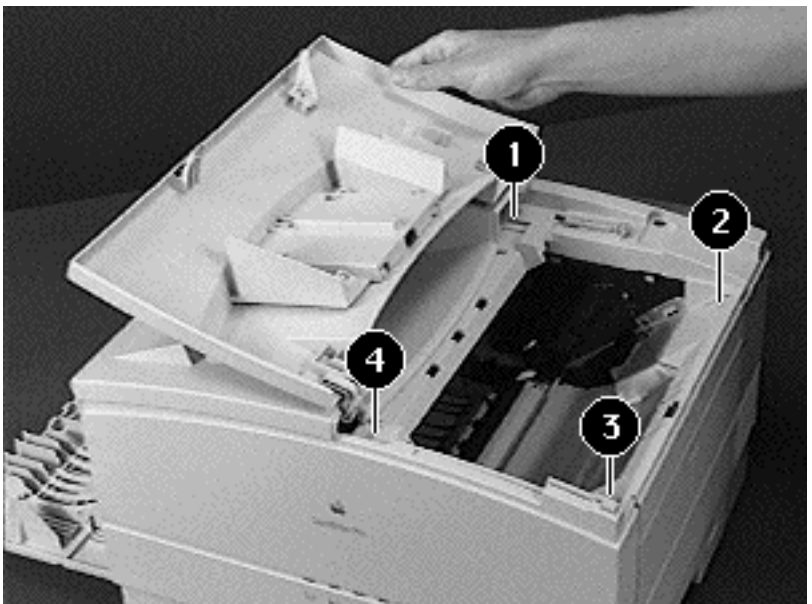


Top Cover

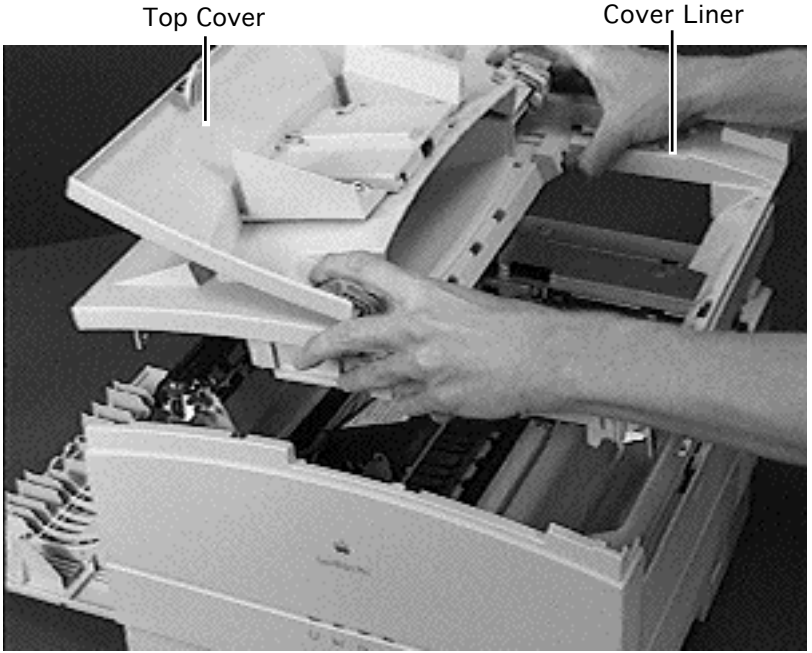
Before you begin, open the multipurpose tray and remove the rear panel

Note: The cover liner comes off with the removal of the top cover.

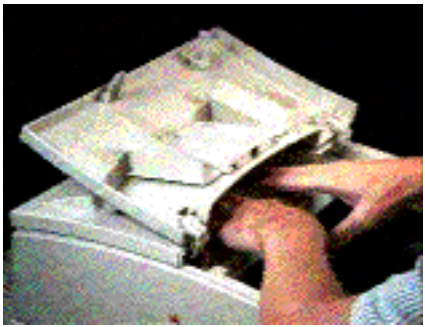
1 Remove the two screws inside the fuser access door.



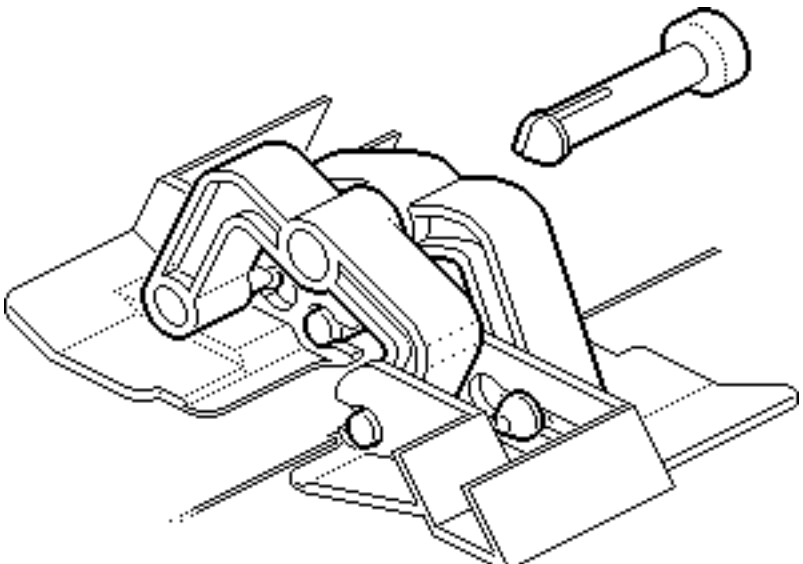
2 Using a small flat-blade screwdriver, release the four flex tabs at the four locations indicated and separate the liner from the printer.



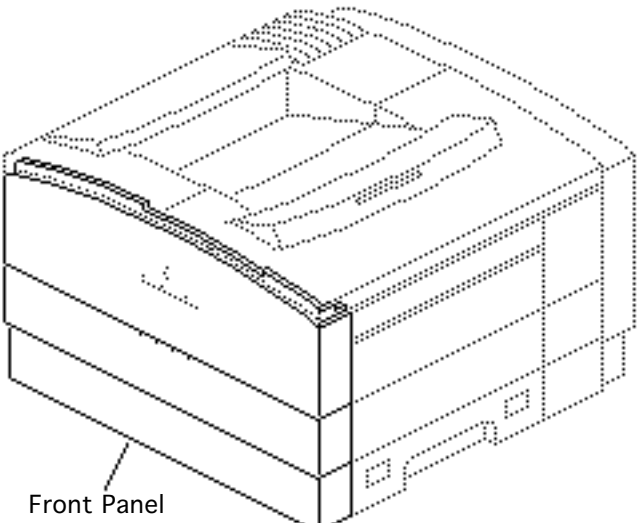
3 Remove the top cover and cover liner from the printer.



Replacement Note:
When you reseat the top cover and cover liner, reach through and gently press the delivery surface until the levelling pin pops into place.



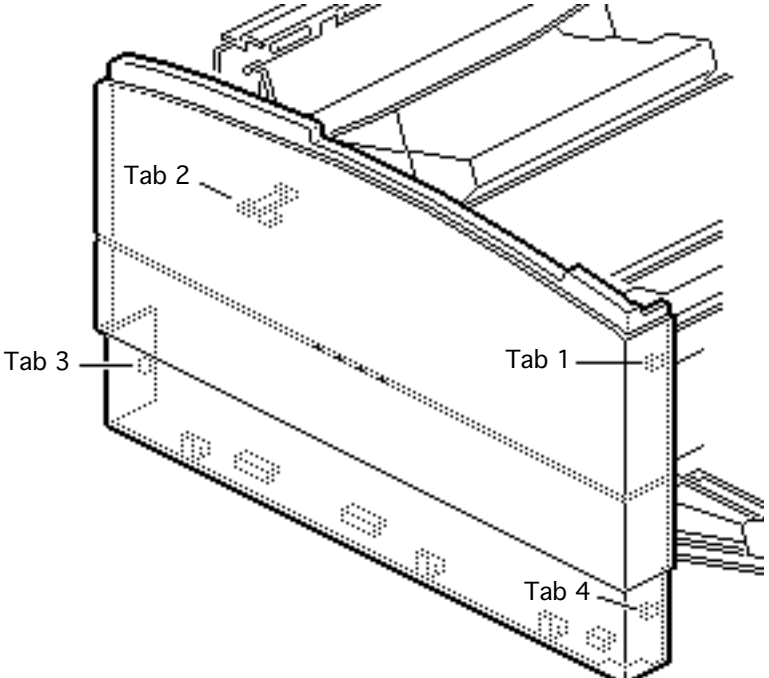
Replacement Note: The two hinge assemblies are identical and are fully interchangeable. The components are also universal (that is, each of the four arms, four housings, and two pins are identical.) The illustration shows the hinge assembly in its correct intact state with the pin exploded out for clarity.



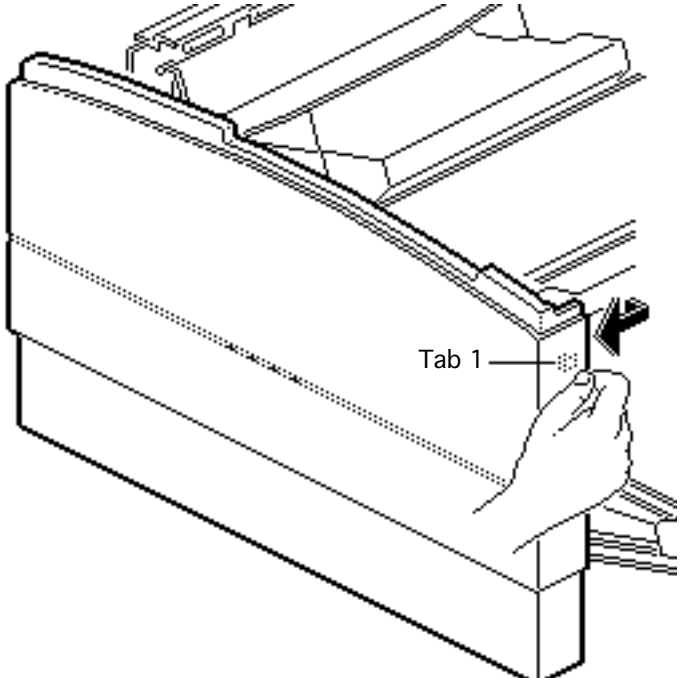
Front Panel

Before you begin, remove the following:

- Rear panel
- Top cover

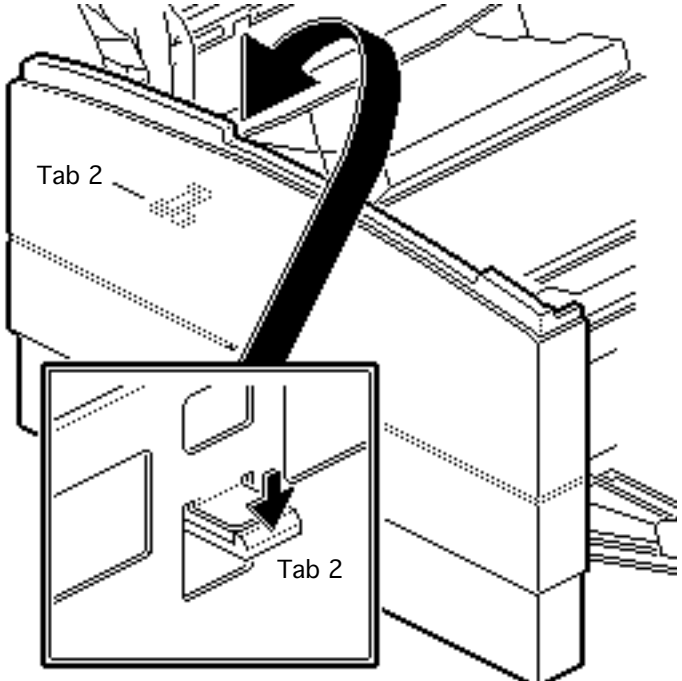


Note: The front panel is secured to the printer by three fixed wrap-around tabs (1, 3, 4), one flex tab (2), and six positioning tabs and blocks along the base. The following pages describe the order of tab release.



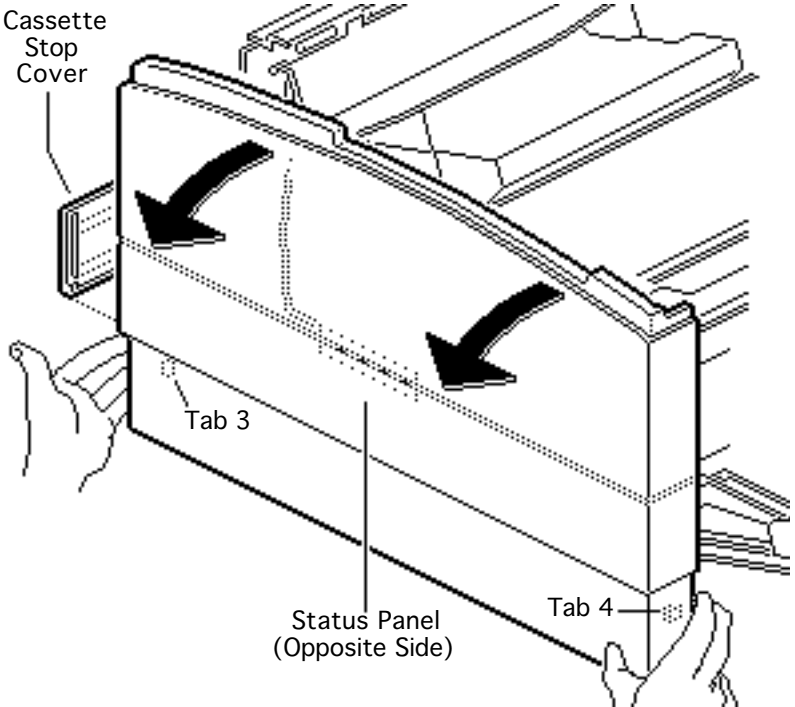
Releasing Tab 1

1 Grasp the front panel with your fingertips and pull it outward slightly to release the upper fixed tab on the right side.



Releasing Tab 2

2 Reach behind the front panel and release the flex tab that secures the front panel to the chassis.

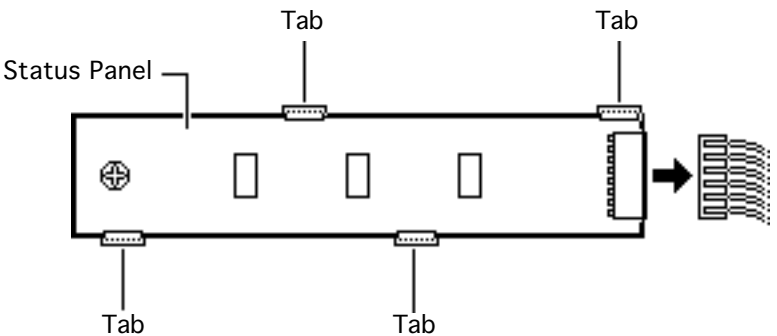


Releasing Tabs 3 and 4

3 Remove the cassette stop cover.

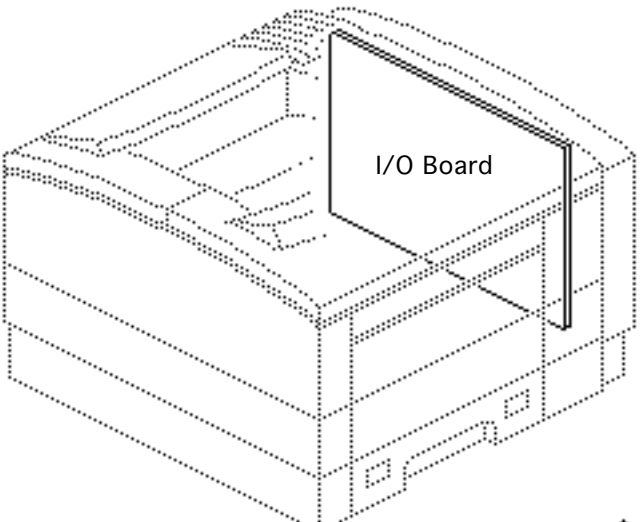
4 **Note:** The status panel will still connect the chassis to the front panel after you perform the following step.

Grip the bottom-left and bottom-right corners with your fingertips, release tabs 3 and 4, and swing the front panel downward.



5 If you need to have functional LEDs after you remove the panel, don't disconnect the connector. Simply release the tabs and lift off the whole status panel.

If you don't need functional LEDs, disconnect the cable from the status panel connector and remove the front panel.



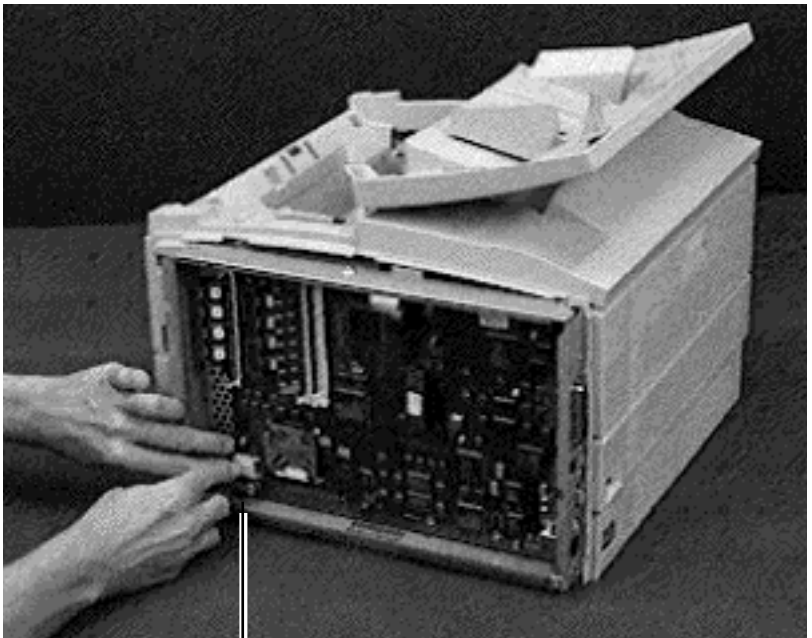
I/O Board

Before you begin, remove the following:

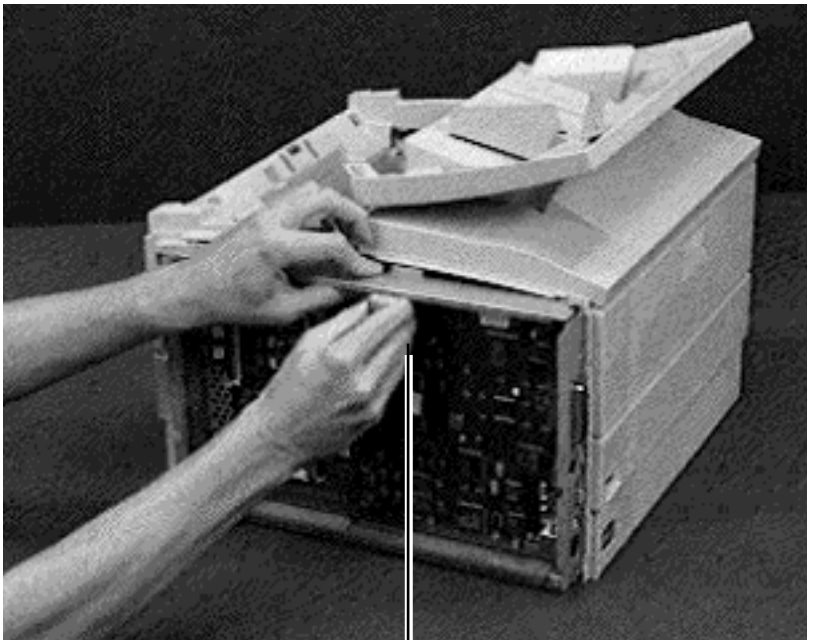
- Rear panel
- Internal hard drive (if present)
- Fax card (if present)

Note: If the I/O board is removed from the printer, the LEDs no longer function.

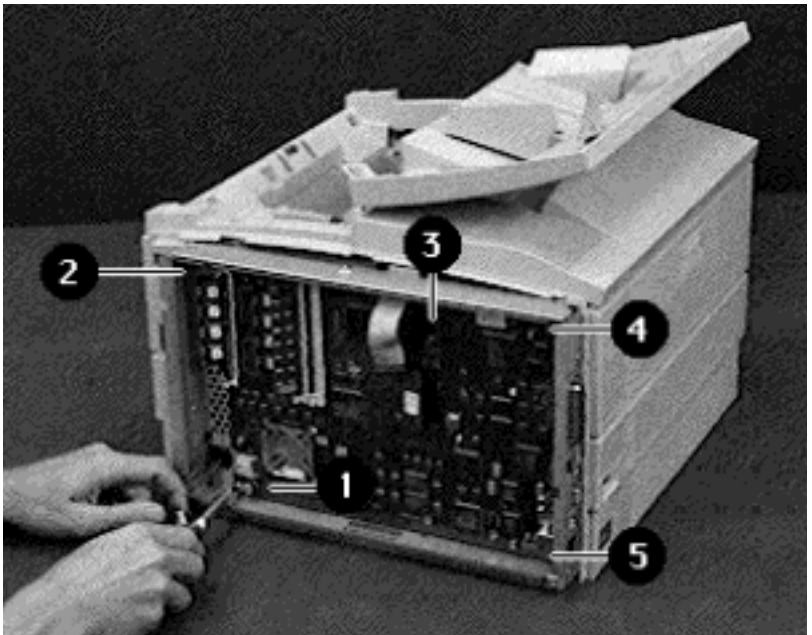
Note: Remove the SIMMs before returning a defective I/O board to Apple.



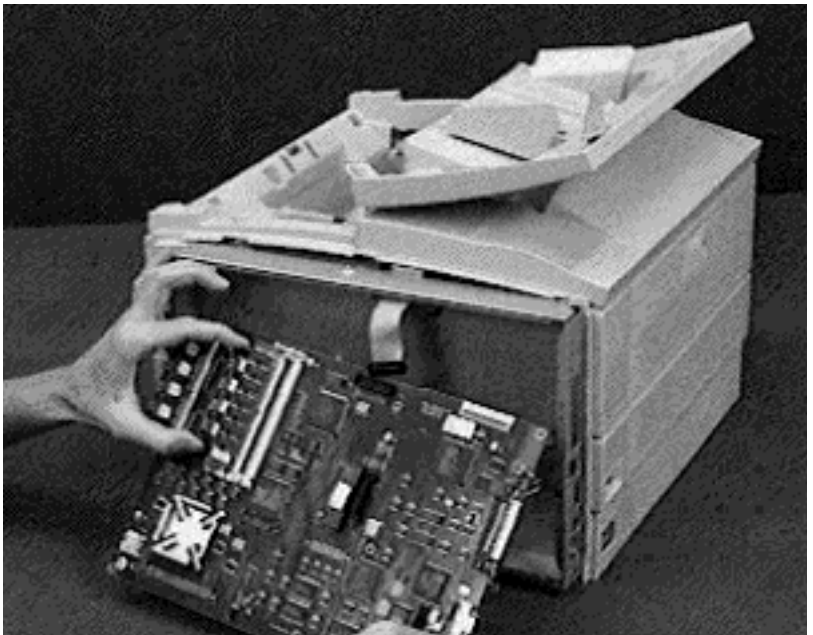
1 Disconnect the power supply cable.



2 Disconnect the printer interface cable.

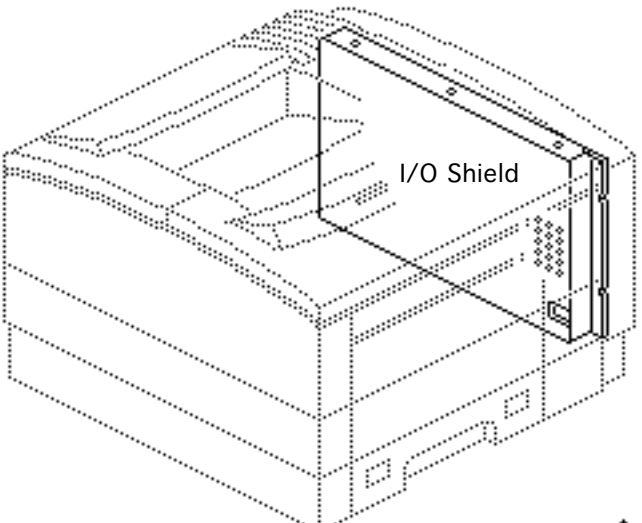


3 Remove the 5 screws that secure the I/O board to the printer.



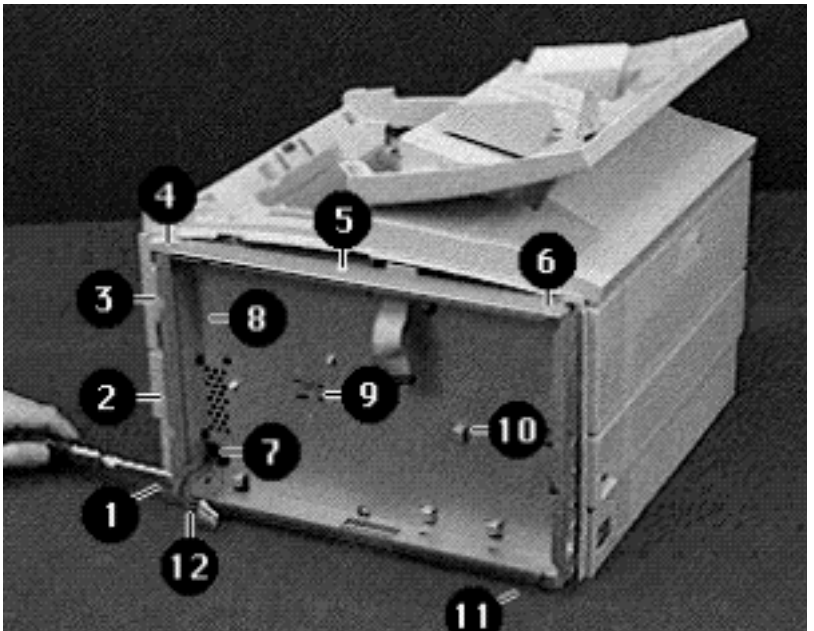
4 Lift the I/O board out of the printer.

I/O Shield

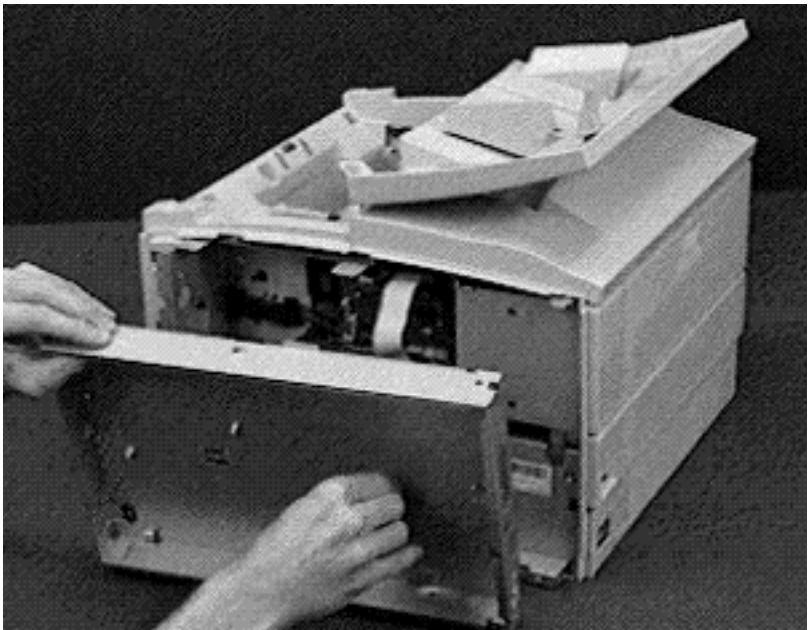


Before you begin, remove the following:

- Rear panel
- I/O board

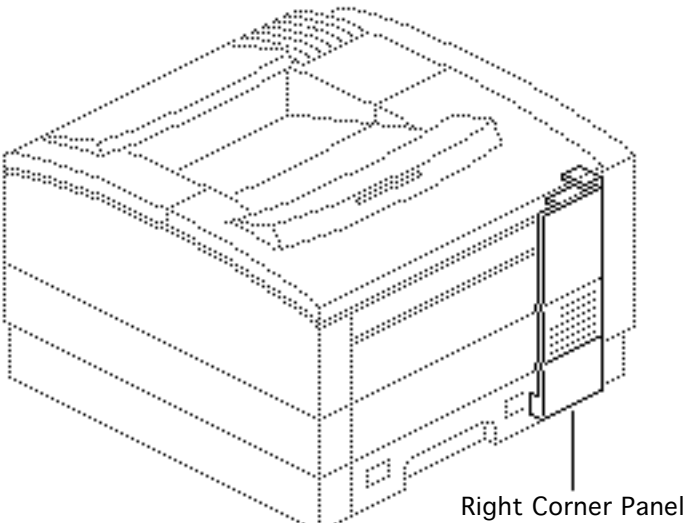


1 Remove the 12 screws that connect the I/O shield to the chassis.



2 Lift the I/O shield from the printer.

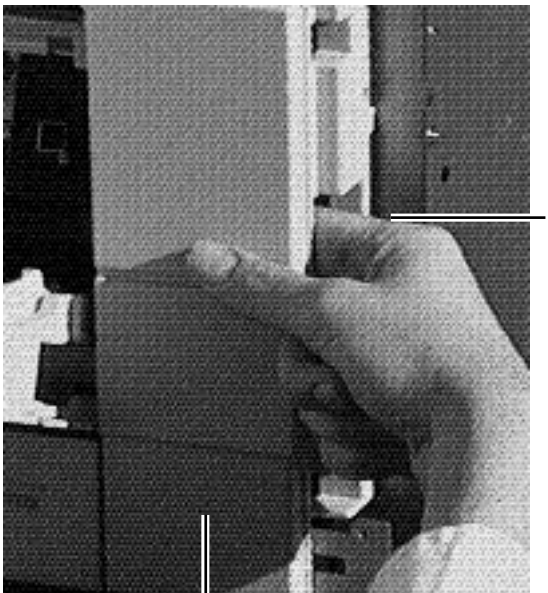
Right Corner Panel



Before you begin, remove the following:

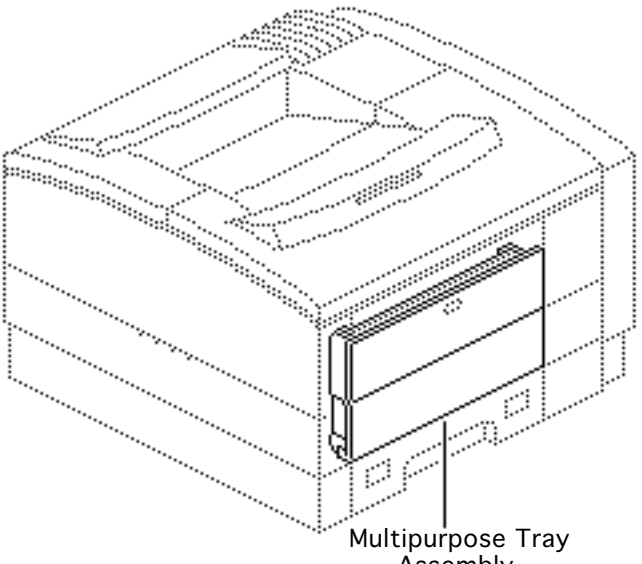
- Rear panel
- Top cover

1 Remove the two screws that secure the right corner panel to the chassis.



2 Reach into the access hole as shown in the photo at the left, and release the hidden flex tab.

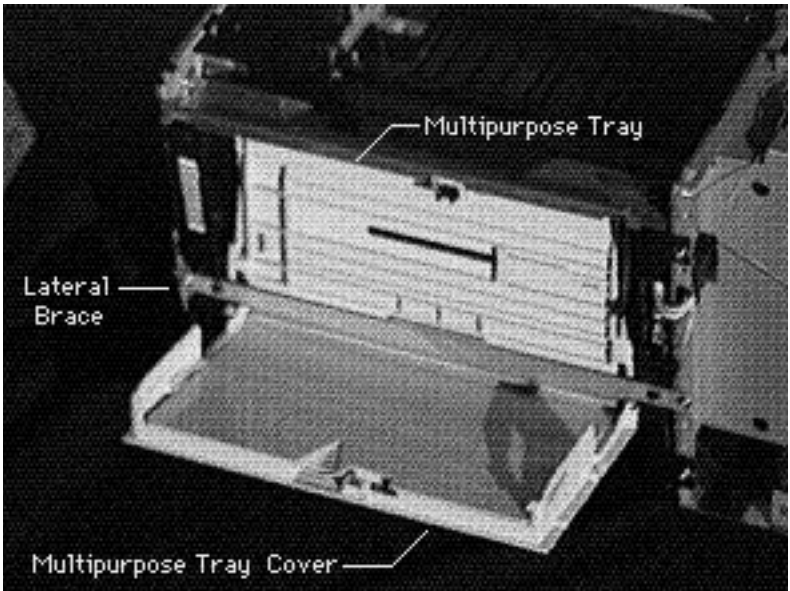
3 Remove the right corner panel from the printer.



Multipurpose Tray Assembly

Before you begin, remove the following:

- Paper cassette
- Rear panel
- Top cover
- Right corner panel
- Front panel



1 Push on the rounded recess at the top of the tray cover and open the multipurpose tray.

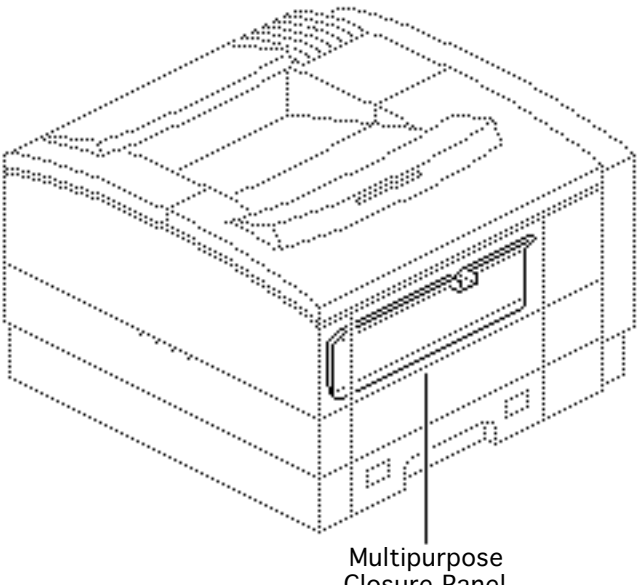
2 Bend the edge guide outward and release the left pin and then the right pin. Tilt the tray up into its normal closed position.

Note: The tray cover and extension guide should now be in an open position as shown in the photograph at the left.

3 Grasp the sides of the cover and bend the center with your thumbs until the cover pops loose from its pin hinges. Remove the multi-purpose tray cover from the printer.

4 Remove the two screws and lift off the lateral brace.

5 Open the multipurpose tray until it angles downward and slide the tray off the holding pins.

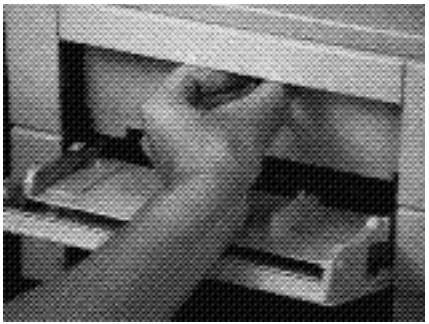


Multipurpose Closure Panel

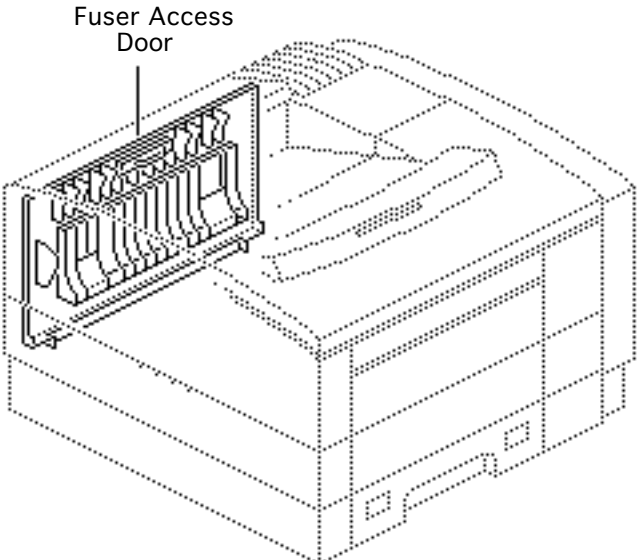
No preliminary steps are required before you begin this procedure.

Note: The user removes this panel prior to installing the envelope feeder.

1 Open the mulitpurpose tray cover by pressing on the cover and letting it drop into feed-ready position.

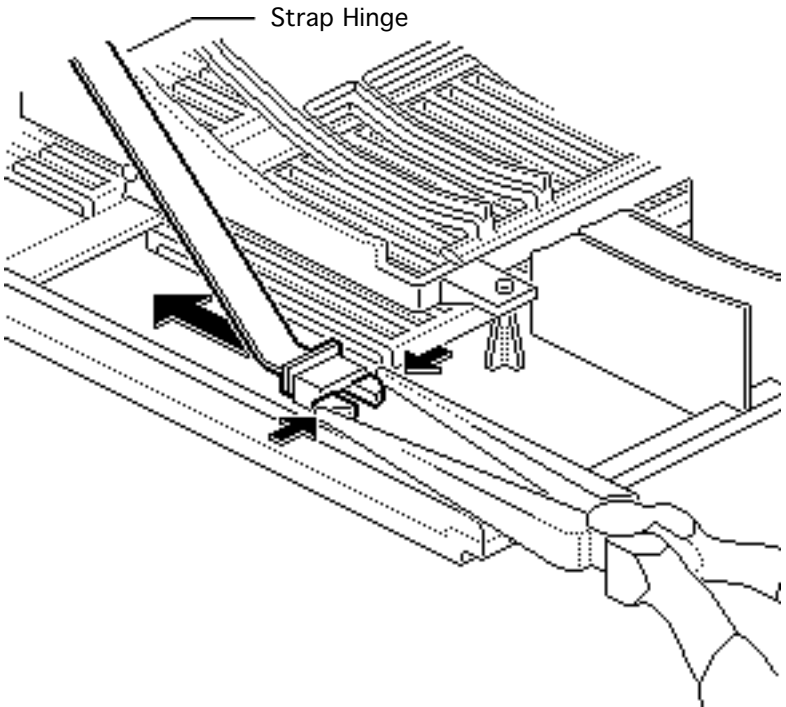


2 Grasp the squared notch at the top of the panel between your thumb and forefinger, press down slightly, and lift out the panel.



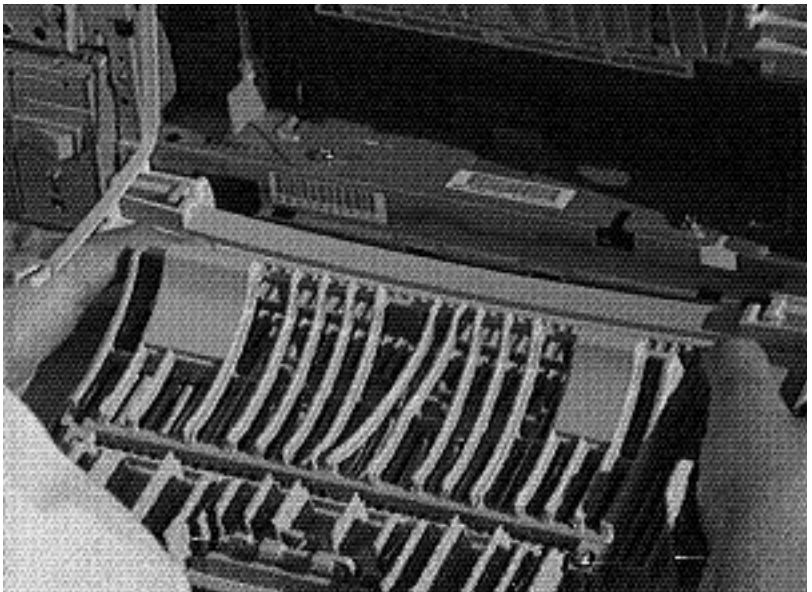
Fuser Access Door

No preliminary steps are required before you begin this procedure.

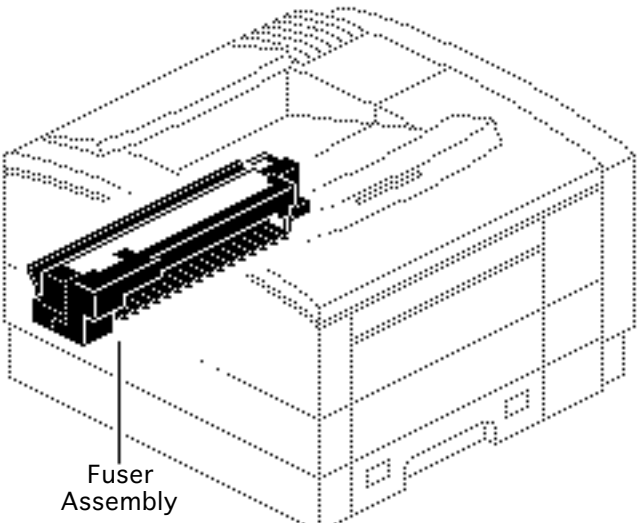


1 Open the fuser access door.

2 Using needlenose pliers, squeeze the flex-tab end of the strap hinge and remove the hinge from its mount.



3 Grasp the sides of the door and bend the center with your thumbs until the door pops loose from its pin hinges.



Fuser Assembly

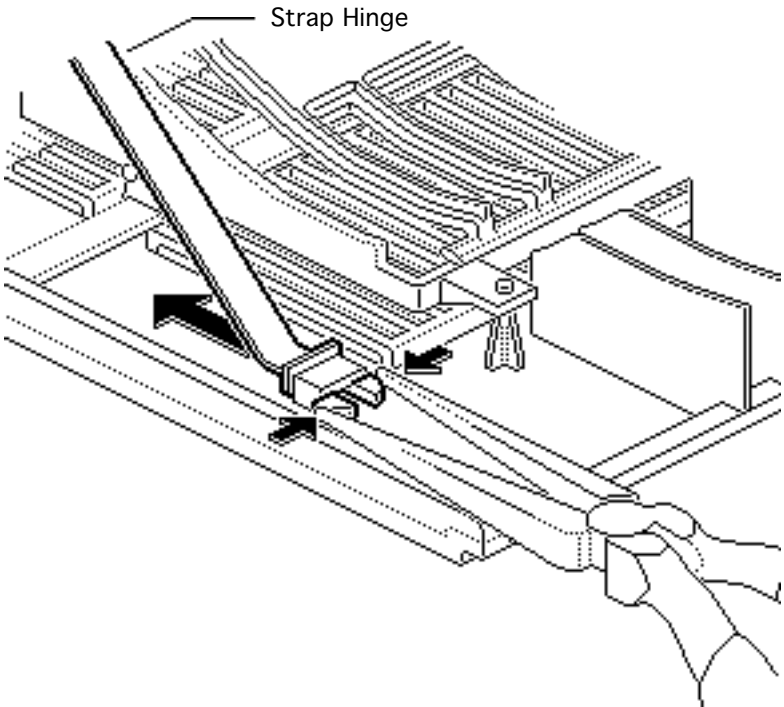
No preliminary steps are required before you begin this procedure.

Note: Refer to the following take-apart topics for further disassembly of the fuser assembly:

- Fuser Cable Cover
- Left Fuser Cover Cap
- Left Fuser Cover
- Fuser Connector Cable
- Fuser Thermoprotector
- Right Fuser Cover
- Fuser Heater Bulb
- Upper Fuser Frame

- Fuser Thermosensor
- Delivery-Sensing Lever

Note: Unless noted otherwise, left and right are defined by viewing the printer through the fuser door opening.



1 Open the fuser access door.

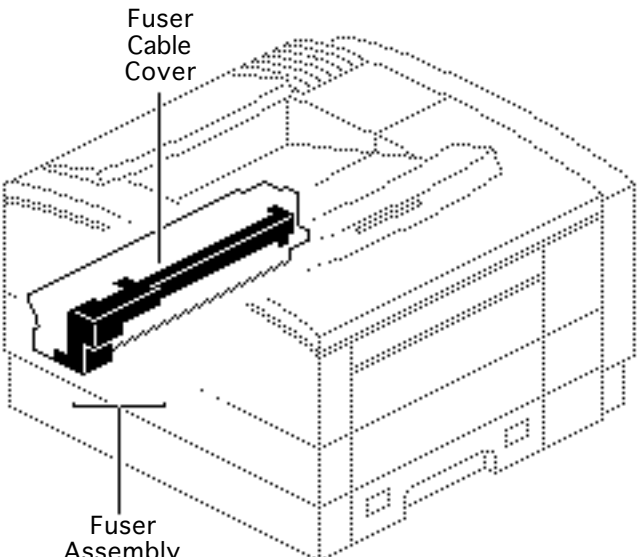
2 Using needlenose pliers, squeeze the flex-tab end of the strap hinge and remove the hinge from its mount.

3 Remove the two screws.

4 **Note:** There is a receptacle left of center on the rear face of the fuser assembly. The receptacle mates with the high-voltage power supply and may cause slight resistance when you pull out the fuser in the following step.

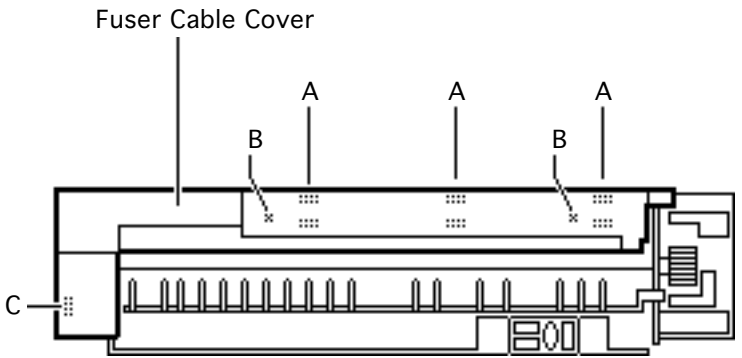
Raise the fuser slightly to clear the two positioning nibs, press down on the green jam-release arm, and pull out the fuser.

Fuser Cable Cover



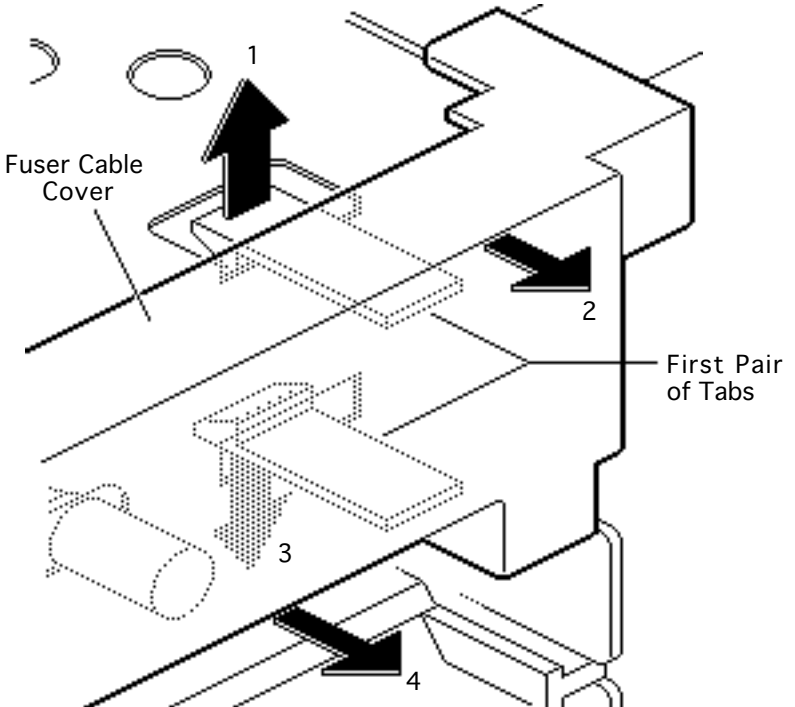
Before you begin, remove the fuser assembly.

Note: The fuser cable cover is the black plastic cover on the intake side of the fuser assembly. The yellow caution label is on the surface of this cover.



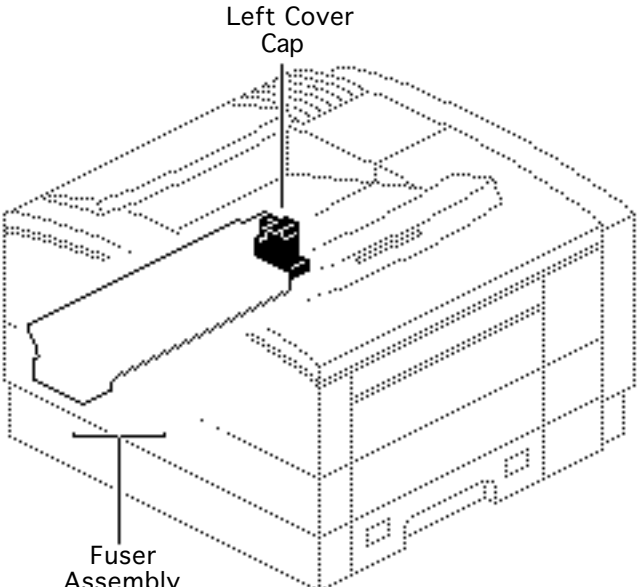
Note: The cable cover is secured to the fuser by three pairs of flex tabs (A) and two conical posts (B) hidden behind the yellow label, and by a single flex tab (C) to the left of the entrance guide.

Use a small flat-blade screwdriver to release the flex tabs. Start at the gear end of the fuser and work left.



1 Release the upper of the first pair of tabs (1) and pull the cover out as far as it will go (2). Then release the bottom tab (3) and pull the cover farther off the fuser assembly (4).

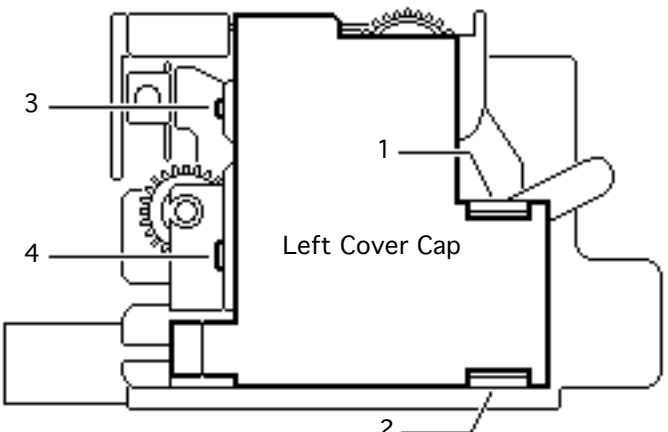
2 Repeat this procedure for the next two pairs of flex tabs and remove the cover from the fuser.



Left Fuser Cover Cap

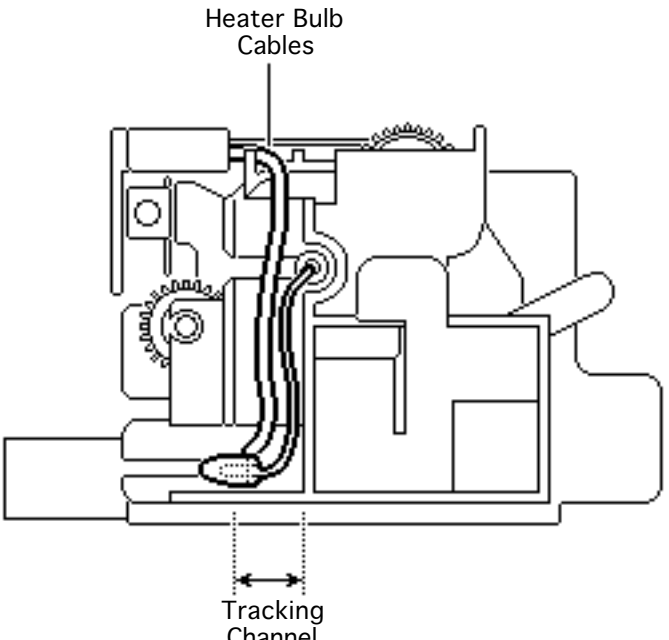
Before you begin, remove the fuser assembly.

Note: The left fuser cover cap is the black plastic cap on the gear end of the fuser assembly.

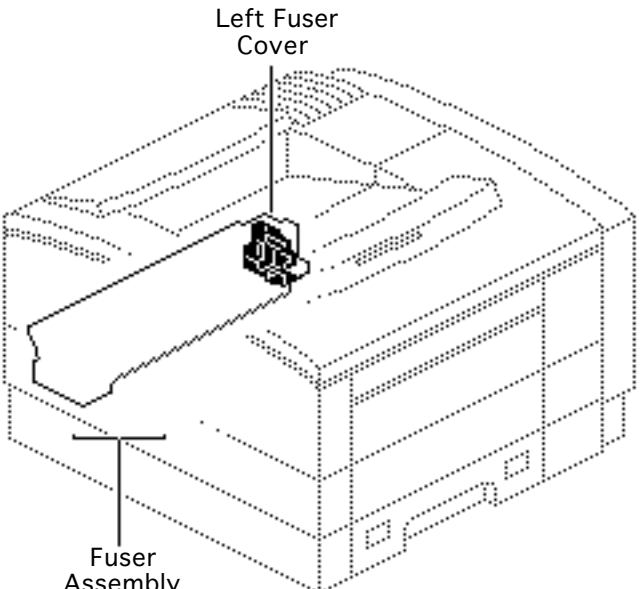


1 Release the two flex tabs (1, 2) and pull the cap from the fuser as far as it will go.

2 Using a small flat-blade screwdriver, unseat the two fixed tabs (3, 4) and pull the cap off the fuser assembly.



Replacement Note: Be sure to press the cables into the tracking channel in the left cover before you replace the cover cap.

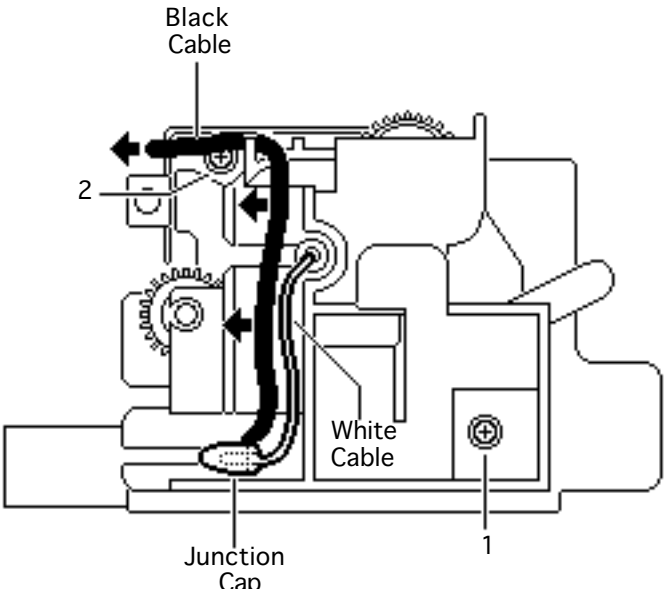


Left Fuser Cover

Before you begin, remove the following:

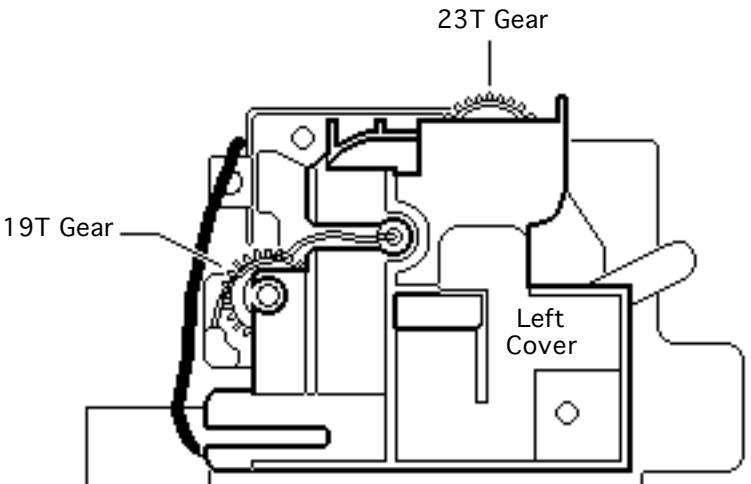
- Fuser assembly
- Fuser cable cover
- Left fuser cover cap

Note: The left fuser cover is the black plastic cover that sits beneath the cover cap on the gear end of the fuser. The left fuser cover supports the end of the heater bulb and encloses the fuser gears.



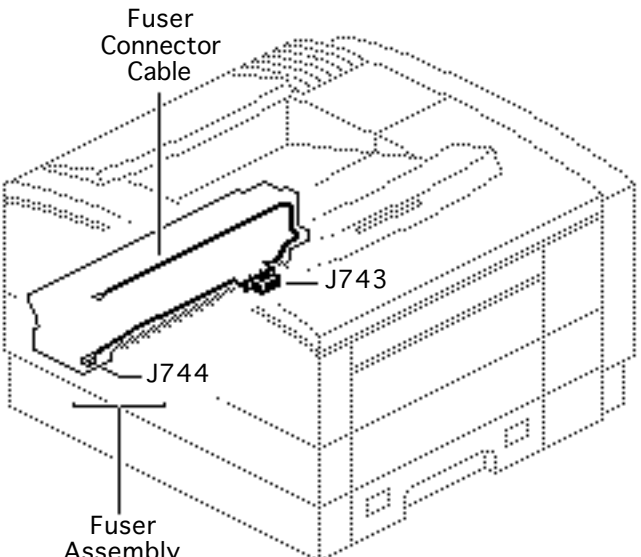
1 Remove the two screws (1 and 2).

2 Remove the black cable from the channel and disconnect the white cable at the junction cap.



3 Pull off the cover.

Caution: The two gears slide off the fuser if you turn the fuser on end. If you are replacing other pieces, remove the gears and set them aside.

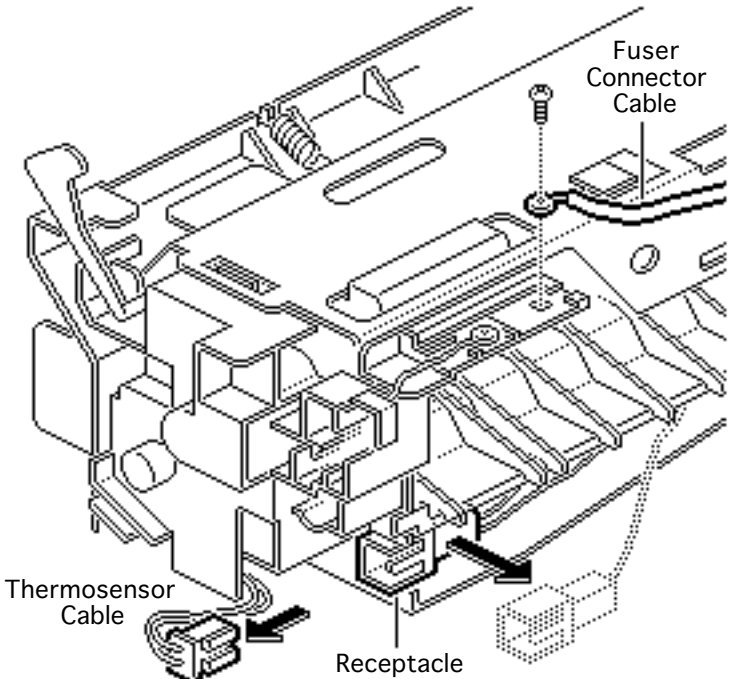


Fuser Connector Cable

Before you begin, remove the following:

- Fuser assembly
- Fuser cable cover
- Left fuser cover cap

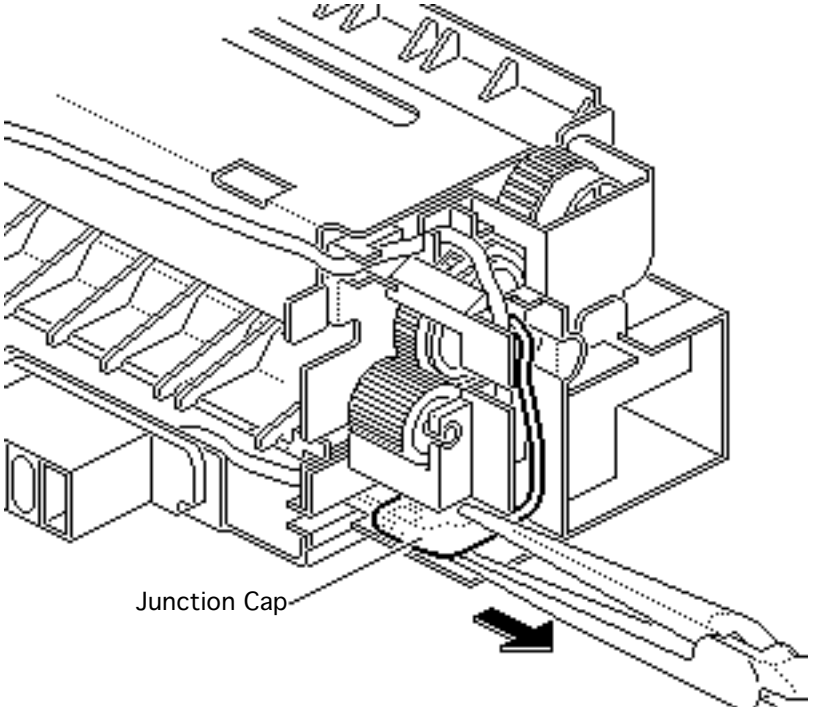
Note: The fuser connector cable delivers high-voltage power to the fuser bulb and receives temperature feedback from the thermosensor. If you are looking from the feed side of the fuser, the thermosensor circuit goes to the left and



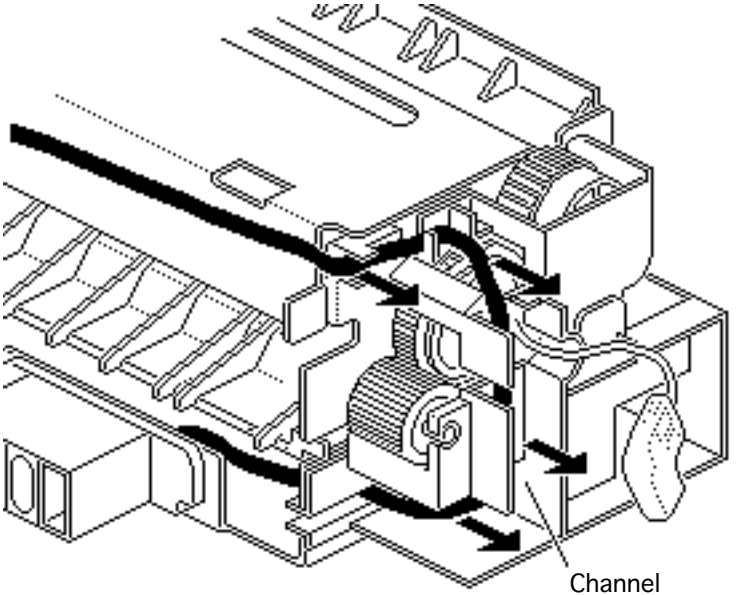
the heater bulb circuit goes to the right.

1 Unplug the thermo-sensor cable and slide the receptacle off the frame.

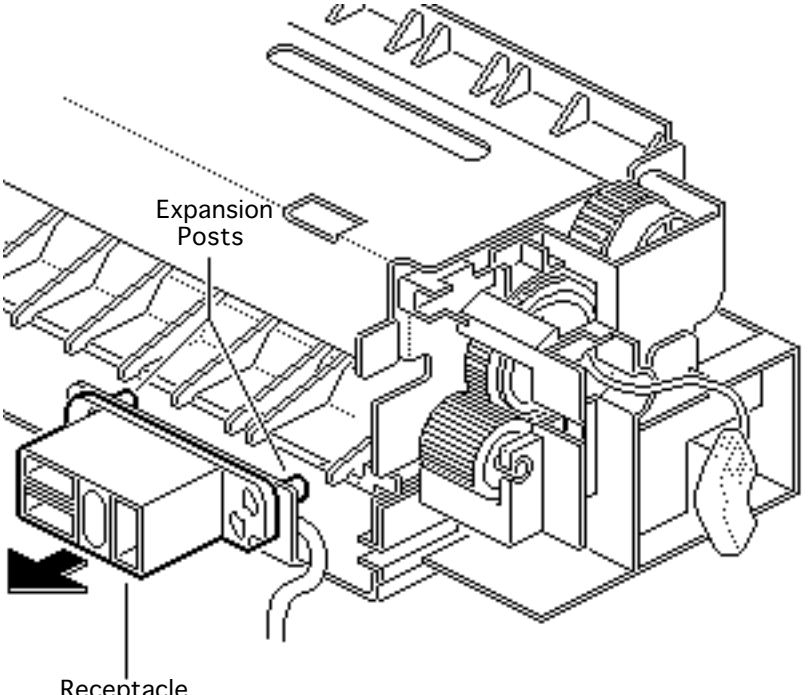
2 Remove the screw that secures the fuser connector cable to the thermoprotector contact.



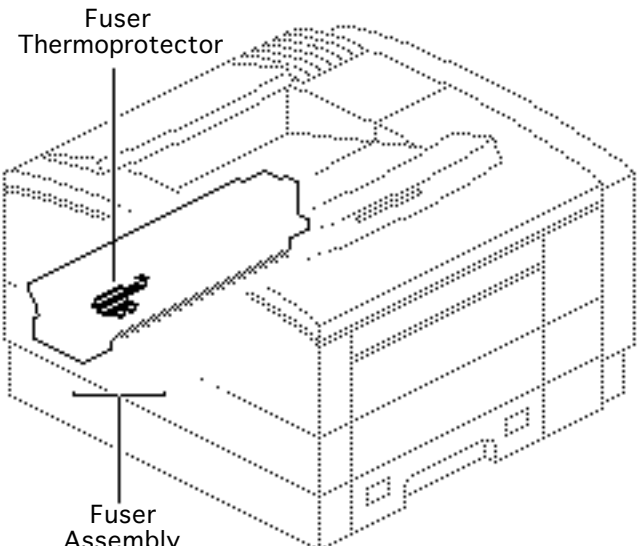
3 Disconnect the white heater bulb cable at the junction cap on the gear end of the fuser.



4 Remove the fuser connector cable from the channel in the left fuser cover.



5 Release the expansion posts behind the receptacle and remove the connector cable from the fuser assembly.



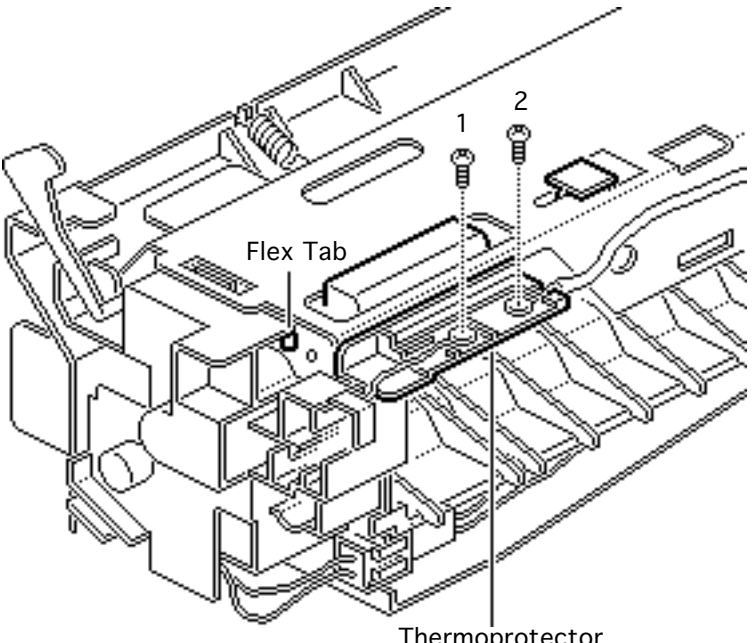
Fuser Thermoprotector

Before you begin, remove the following:

- Fuser assembly
- Fuser cable cover

Note: The fuser thermoprotector prevents overheating of the fuser bulb.

Caution: When the thermoprotector has blown, replacing it does not necessarily solve the problem. You must

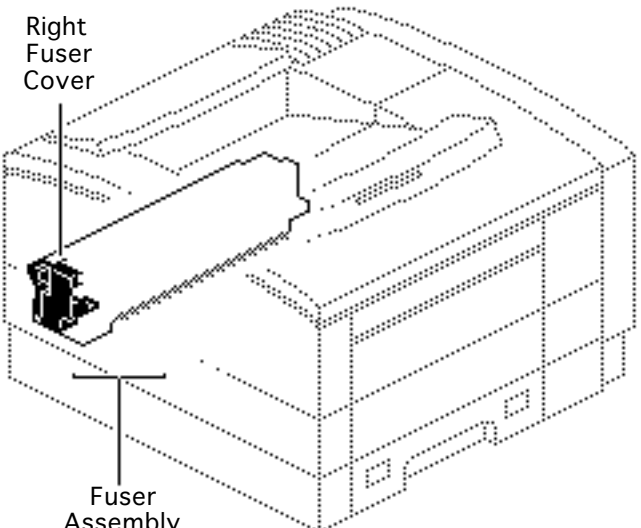


investigate root causes of the overheating.

1 Remove the two screws that secure the cables to the thermoprotector contacts.

2 Press the flex tab that is visible just under the right cover and pop out the thermoprotector assembly.

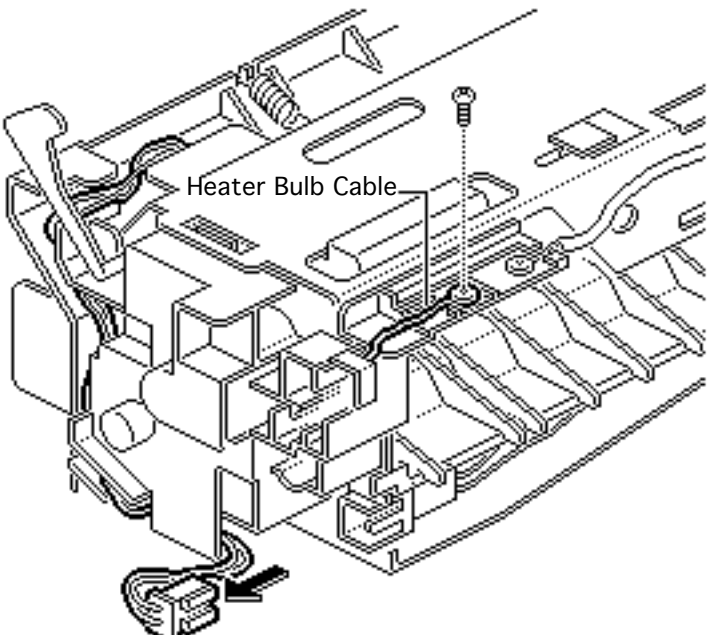
Right Fuser Cover



Before you begin, remove the following:

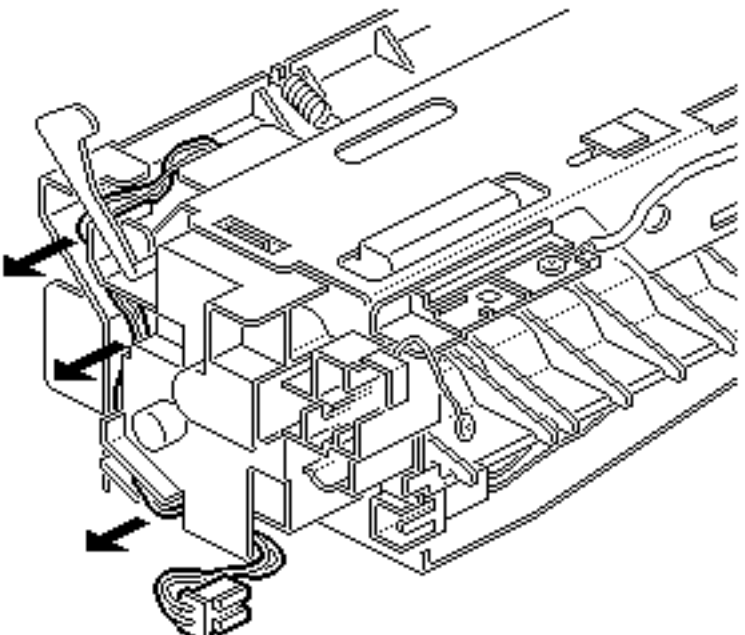
- Fuser assembly
- Fuser cable cover

Note: The right fuser cover is the black plastic cover on the lever end of the fuser assembly. The right fuser cover supports the end of the heater bulb and routes the thermosensor cabling.



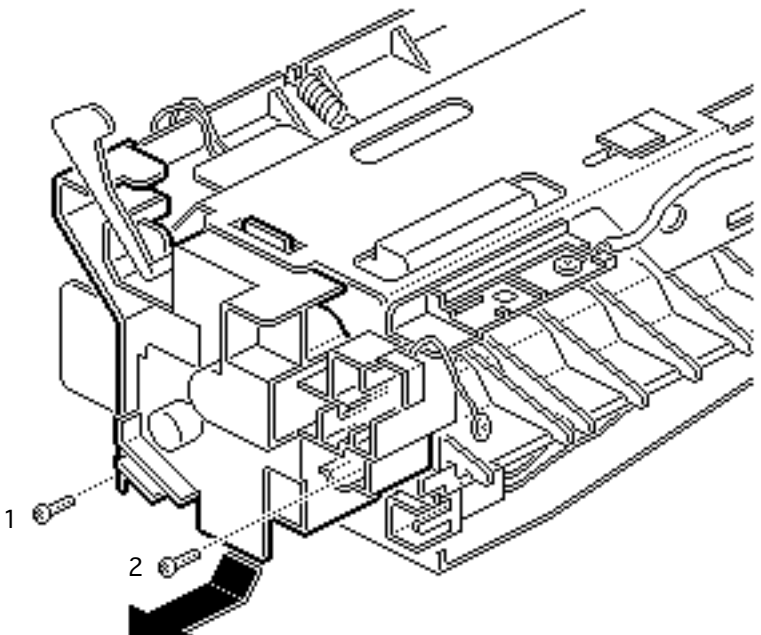
1 Unplug the thermo-sensor cable.

2 Remove the screw that secures the heater bulb cable to the thermo-protector contact.



Thermosensor Cable

3 Remove the thermosensor cable from the channel in the fuser cover.



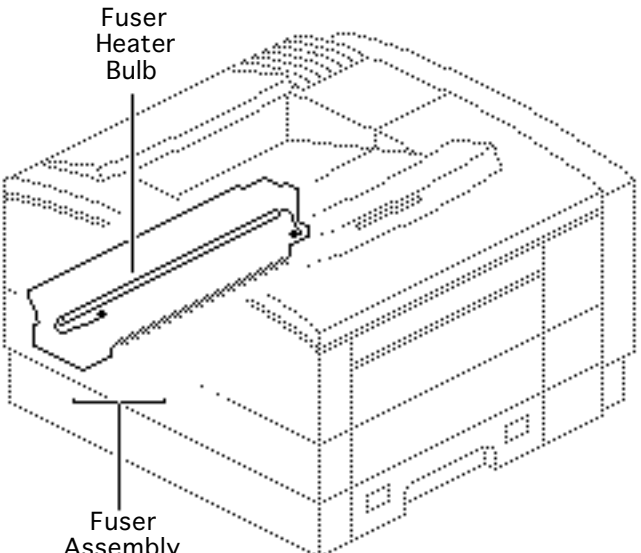
4 Remove the two brass colored screws.

5 Pull the cover down slightly to unseat it from the upper frame, and lift the cover off the fuser.

Note: It may be necessary to pry a bit between the cover and the frame with a small flat-blade screwdriver.

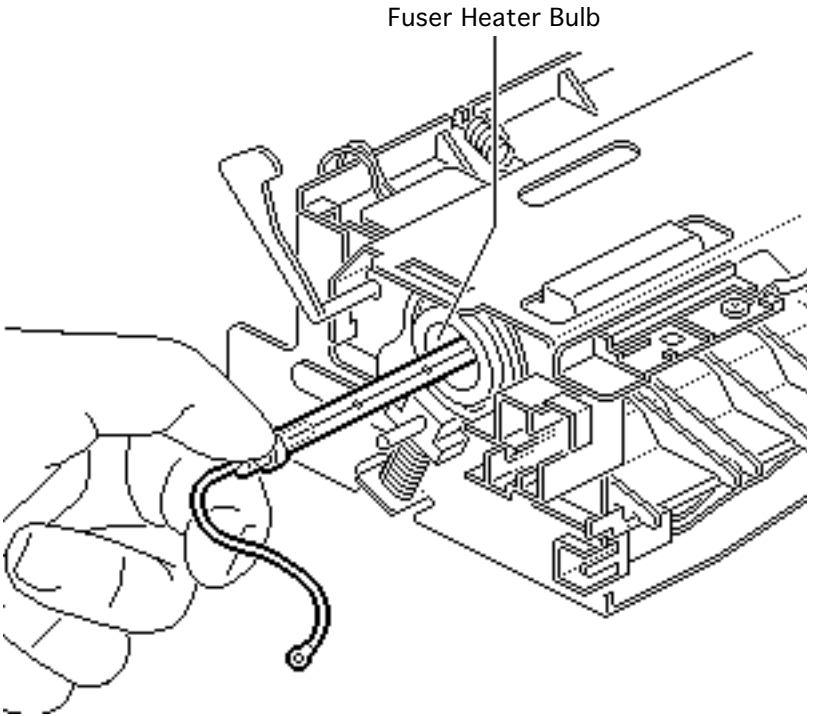
Replacement Note: Make sure that the roller release lever is set in place correctly prior to reassembly.

Fuser Heater Bulb



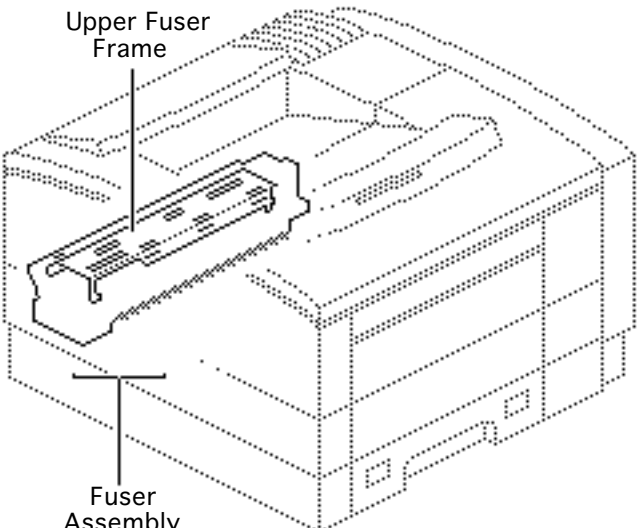
Before you begin, remove the following:

- Fuser assembly
- Fuser cable cover
- Left fuser cover cap
- Left fuser cover
- Right fuser cover



1 **Note:** Be careful not to touch the glass part of the bulb with your fingers.

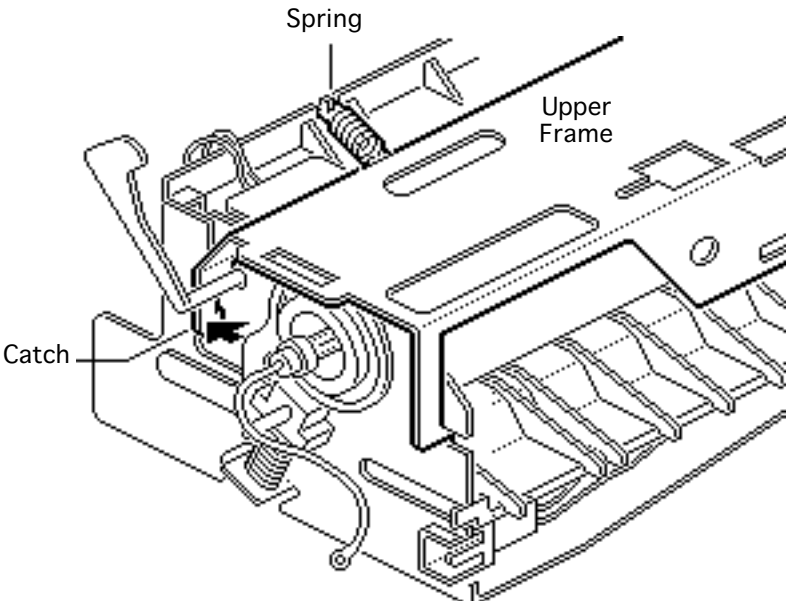
Grasp the left end of the bulb and carefully slide the bulb out of the fuser assembly.



Upper Fuser Frame

Before you begin, remove the following:

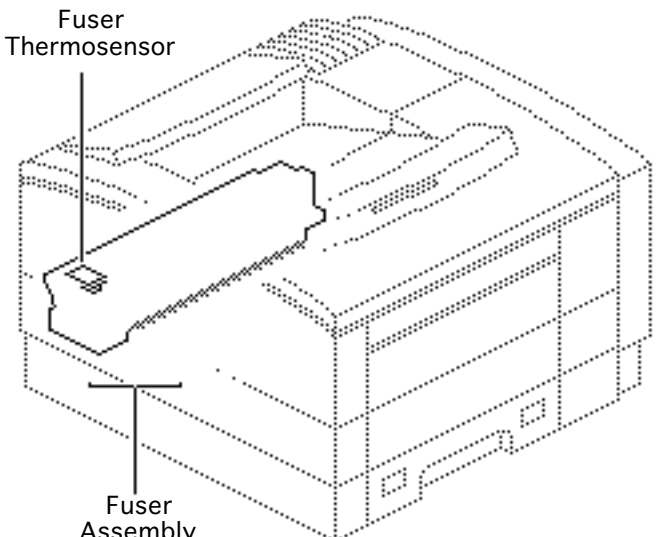
- Fuser assembly
- Fuser cable cover
- Fuser thermoprotector
- Left fuser cover cap
- Right fuser cover



Note: In the following steps, only the spring and the catch on the near side are shown in the drawing.

1 Remove the two springs.

2 Release the catches at each end of the upper frame and lift the frame up and off the fuser assembly.

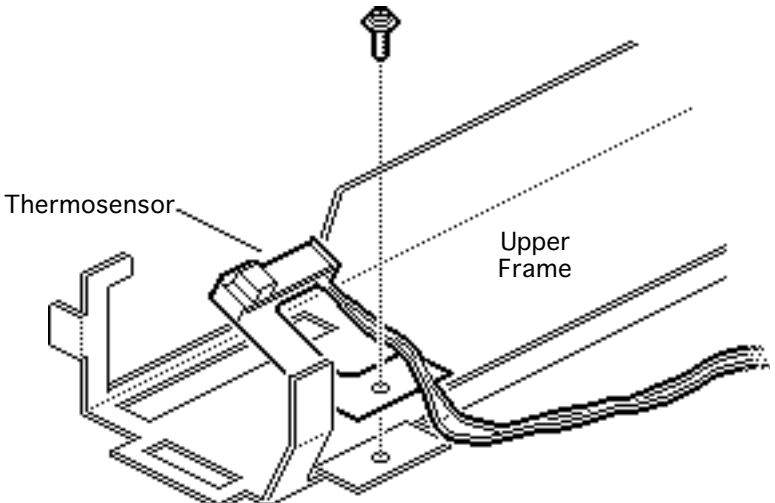


Fuser Thermosensor

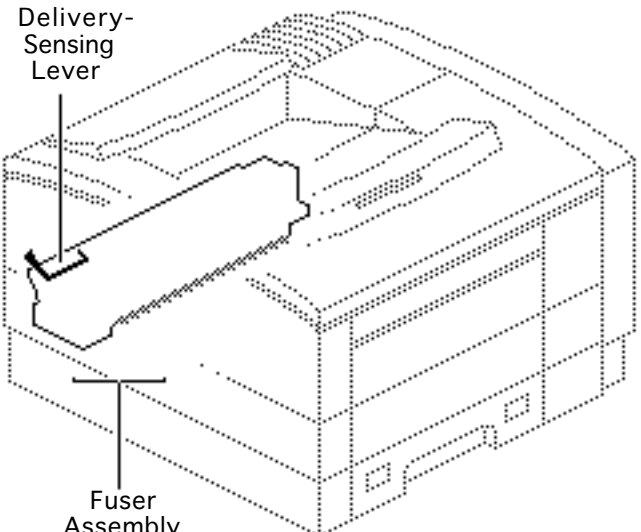
Before you begin, remove the following:

- Fuser assembly
- Fuser cable cover
- Fuser thermoprotector
- Left fuser cover cap
- Right fuser cover
- Upper fuser frame

Note: The thermosensor monitors the temperature of the fuser bulb and relays the temperature back to the DC controller board.



1 Remove the screw that connects the thermosensor to the upper fuser frame and lift off the thermosensor.

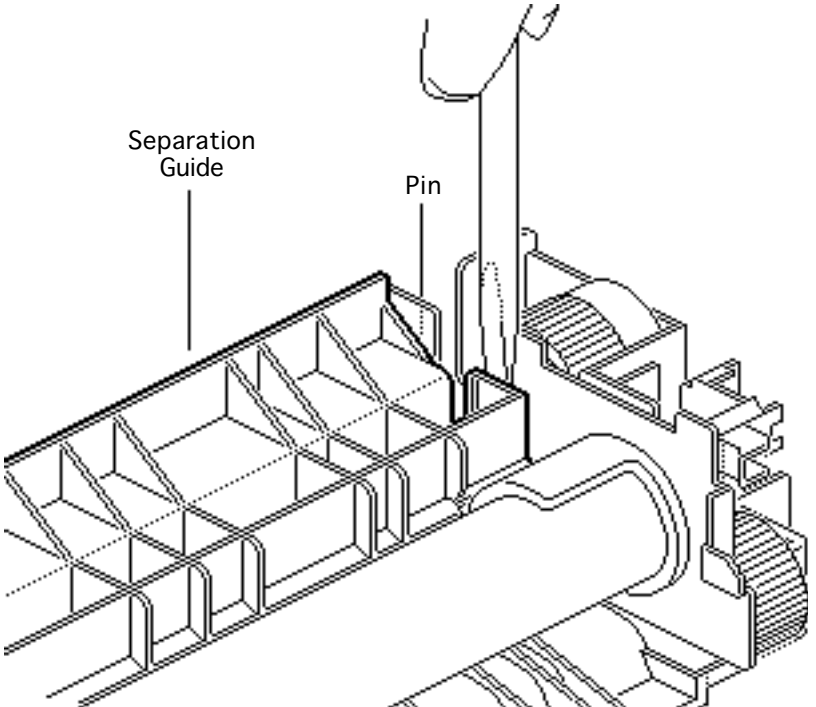


Delivery-Sensing Lever

Before you begin, remove the following:

- Fuser assembly
- Fuser cable cover
- Fuser thermoprotector
- Left fuser cover cap
- Right fuser cover
- Upper fuser frame

Note: Paper exiting the fuser trips the delivery-sensing lever, which in turn opens a photo interrupter in the delivery/interlock sensor assembly. See

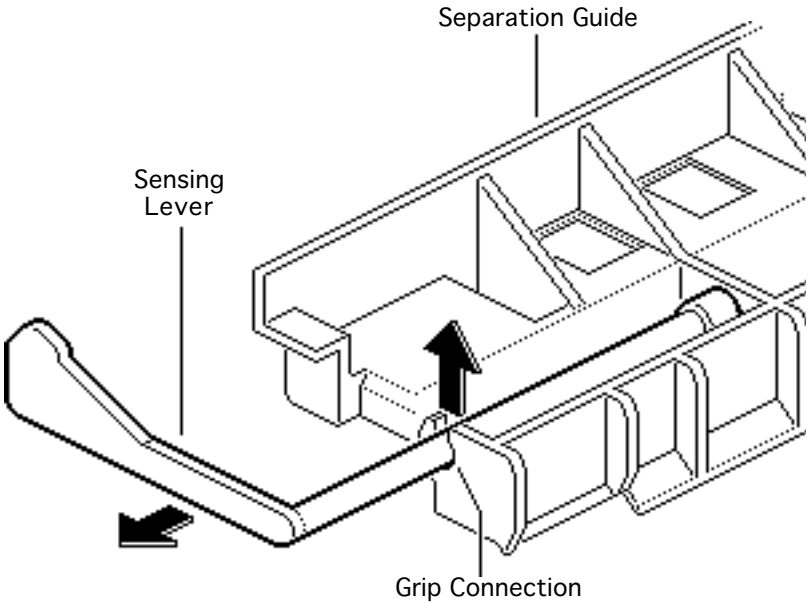


"Sensing System Theory" in Basics.

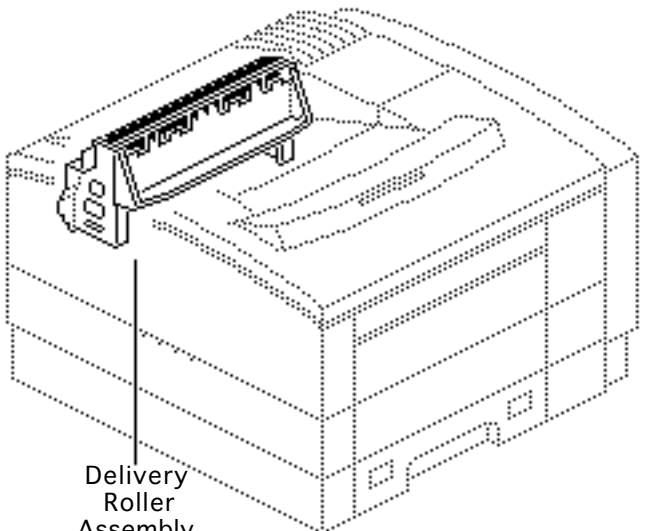
1 **Note:** There are two pins at the ends of the separation guide that seat into the frame. Only one end is shown in the drawing.

Using a small flat-blade screwdriver, pry the separation guide off the frame at the gear end of the fuser assembly.

2 Lift the separation guide from the fuser assembly.



3 Snap the lever out of the grip in the separation guide and pull the lever off the post.



Delivery Roller Assembly

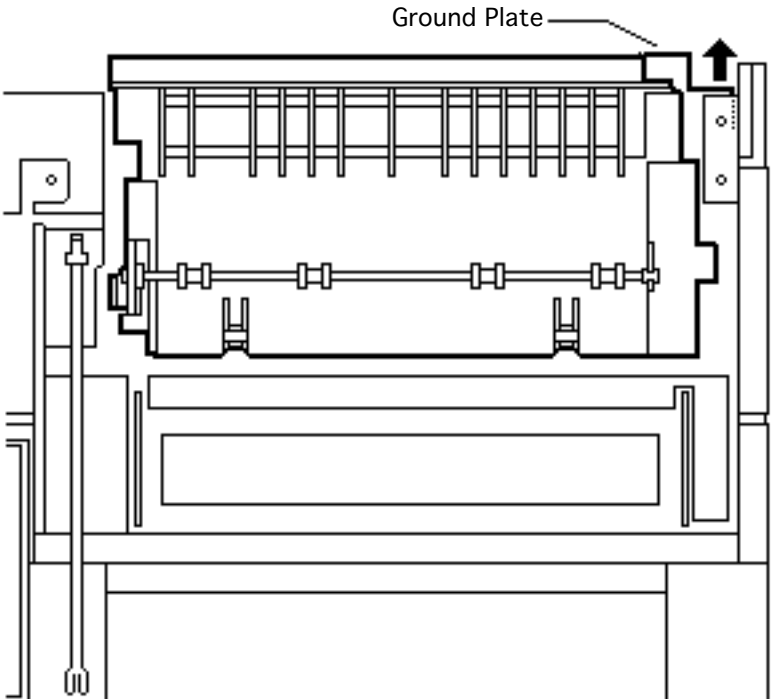
Before you begin, remove the following:

- Rear panel
- Top cover

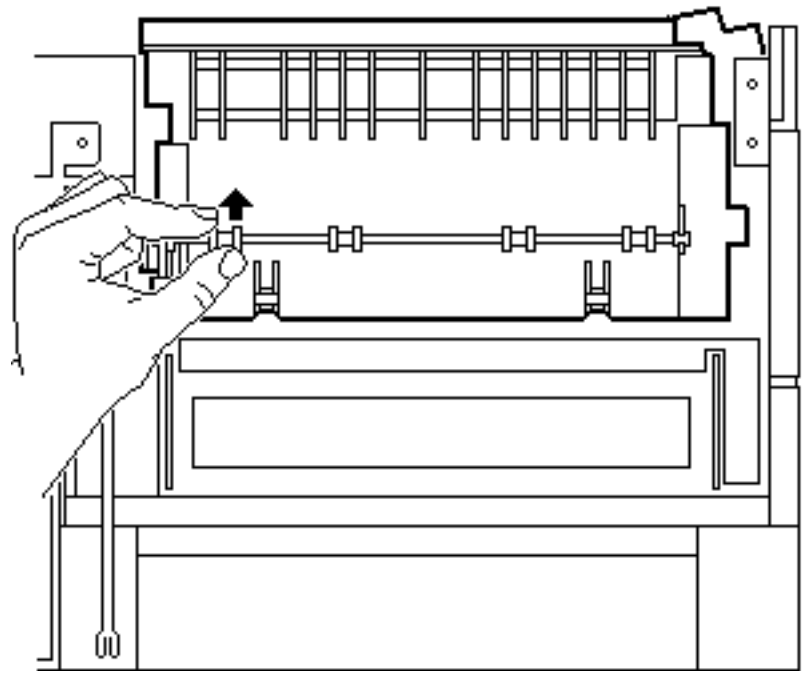
Note: Refer to the following take-apart topics for further disassembly of the delivery roller assembly:

- Upper Delivery Guide
- Lower Delivery Roller Shaft
- Upper Delivery Roller Shaft
- Delivery Drive Belt

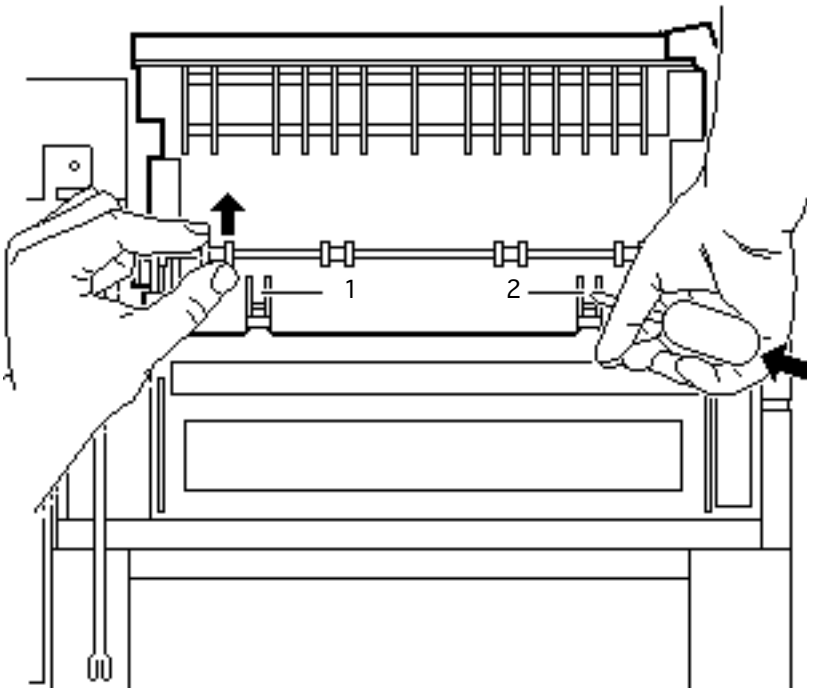
Note: The double-roller shaft design yields an S-shaped paper path that handles heavier paper than was possible in previous engines. As a result, there is no face-up delivery tray in the LaserWriter 16/600 PS.



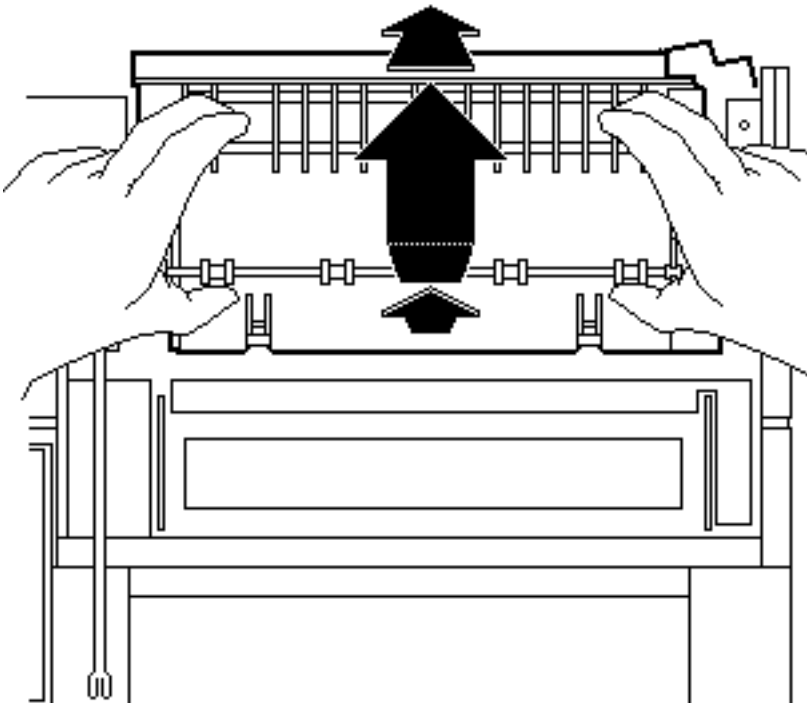
1 Disconnect the ground plate from the chassis.



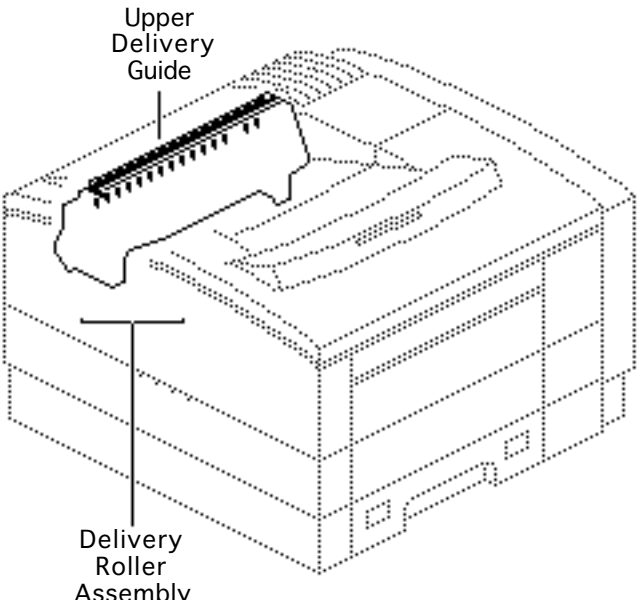
2 Place your left hand as shown and press upward on the lower roller shaft.



3 Using a small flat-blade screwdriver, press in on the left gripper tab (1) and then the right tab (2), and disengage the assembly from the chassis.



4 Place your right hand opposite your left and pull the assembly from the printer, using the rolling motion indicated.



Upper Delivery Guide

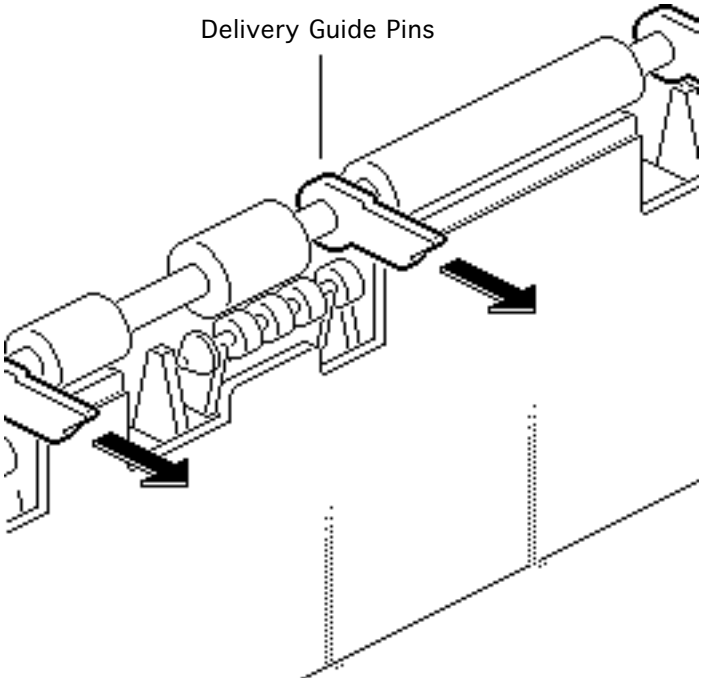
Before you begin, remove the following:

- Rear panel
- Top cover

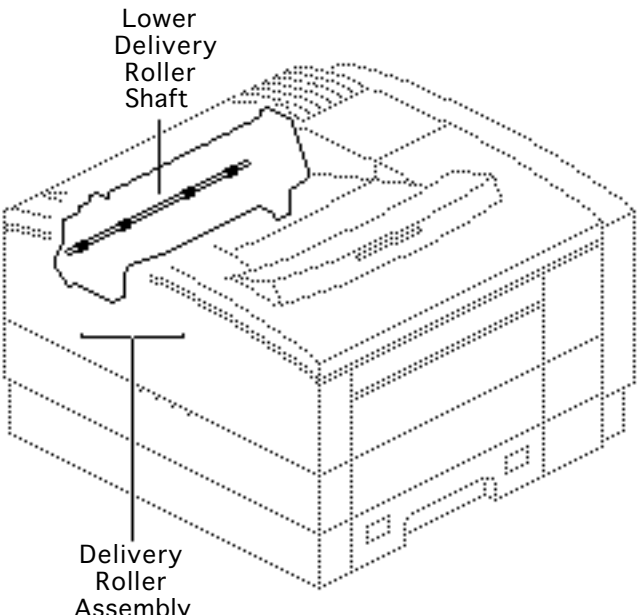
1 Disconnect the ground plate from the chassis.

2 Release the flex tab on the right side of the delivery roller assembly and pop the delivery guide free of the upper delivery roller.

3 Release the tab and grip on the left side and remove the delivery guide from the delivery roller assembly.



Replacement Note: The four small delivery guide pins that hang freely on the upper shaft must point outward (with the flow of paper).



Lower Delivery Roller Shaft

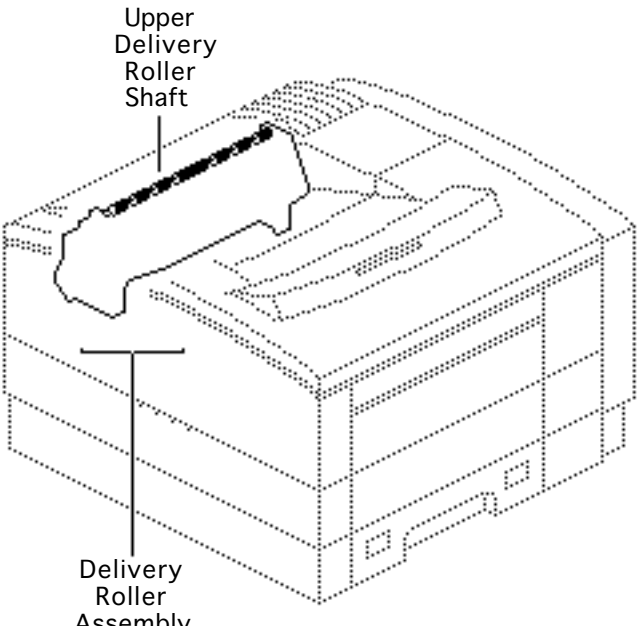
Before you begin, remove the following:

- Rear panel
- Top cover
- Delivery roller assembly

1 Remove the E-ring on the right side of the shaft and slide off the bushing.

2 **Caution:** The four lower passive delivery rollers will fall out when you perform the following procedure.

Push the delivery roller shaft to clear the left grip and drive belt and lift the shaft from the delivery roller assembly.



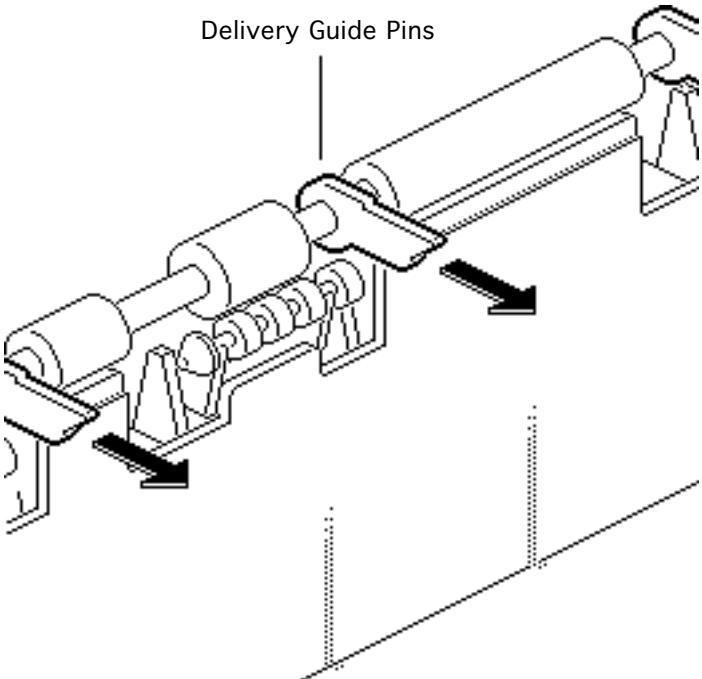
Upper Delivery Roller Shaft

Before you begin, remove the following:

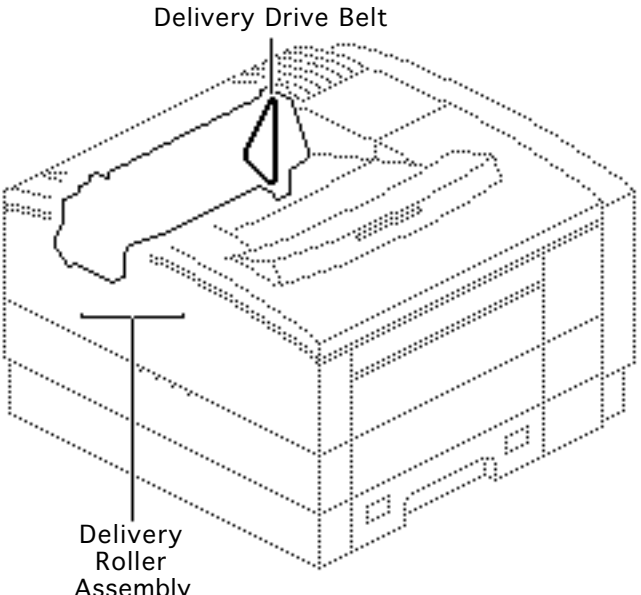
- Rear panel
- Top cover
- Delivery roller assembly
- Upper delivery guide

1 Remove the E-ring on the right side of the shaft and slide off the bushing.

2 Push the delivery roller shaft to clear the left grip and drive belt and lift the shaft from the delivery roller assembly.



Replacement Note: The four small delivery guide pins that hang freely on the upper shaft must point outward (with the flow of paper).

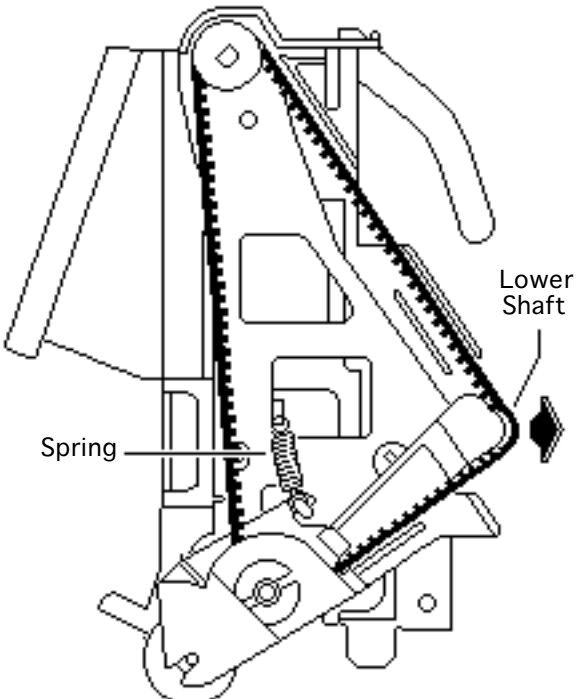


Delivery Drive Belt

Before you begin, remove the following:

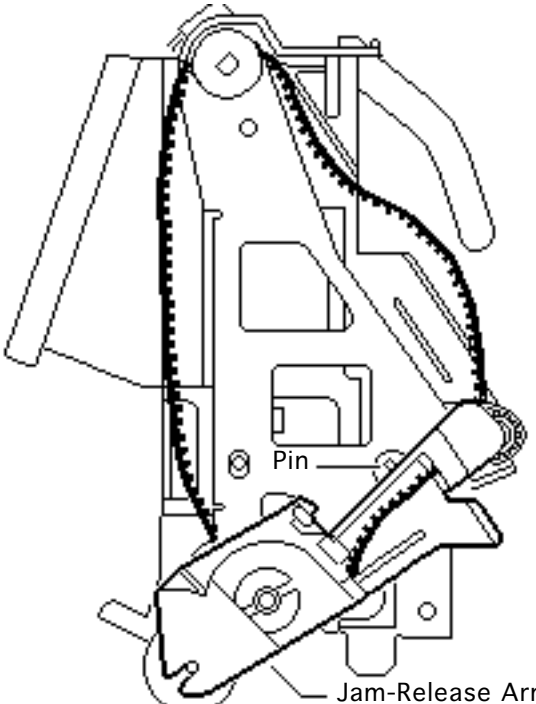
- Rear panel
- Top cover
- Delivery roller assembly

Note: This cogged belt transfers drive upward to the delivery roller shafts. See “Mechanical Drive Theory” in Basics.

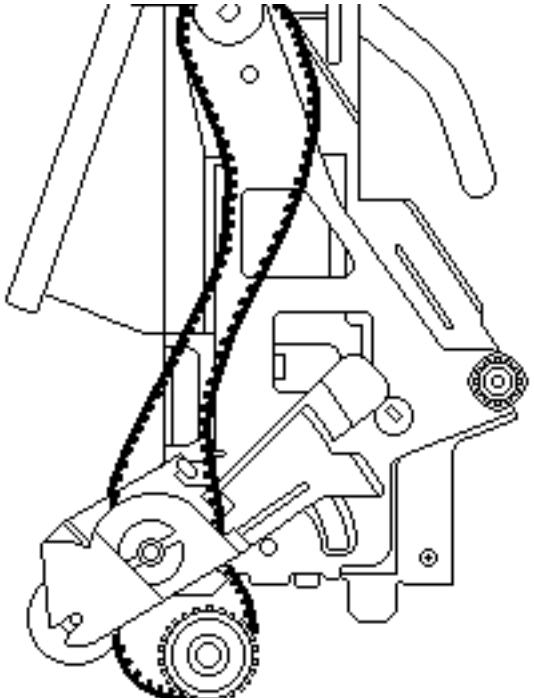


1 Remove the spring.

2 Slip the drive belt off the gear on the lower delivery roller shaft.



3 Rotate the green jam-release arm counter-clockwise as far as it will go, lifting the arm slightly to clear the small wedge-shaped pin.



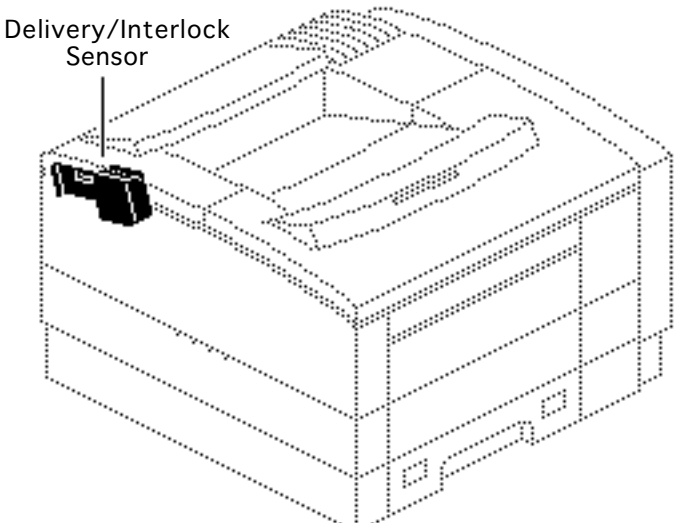
4 Pry off the jam-release arm with a small flat-blade screwdriver.

Note: The spindle is connected to the end plate so the gear is now free. It stays in place because the drive belt is holding it.

5 Push the belt through, slip off the gear, and pull out the drive belt.

Replacement Note: The final step in replacement is the looping of the belt over the lower roller shaft gear.

First, use the rounded end of the jam-release arm to stretch the belt outward. Then with your fingertips pressing the belt firmly against the side of the gear, slowly rotate the drive shaft and let the belt shift onto the gear.

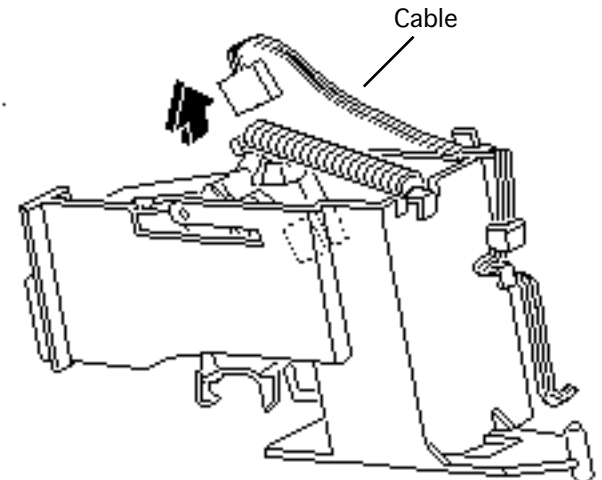


Delivery/Interlock Sensor

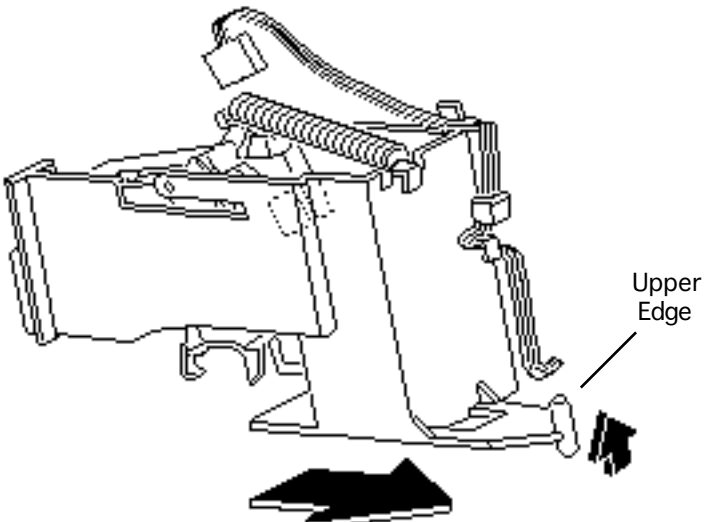
Before you begin, remove the following:

- Rear panel
- Top cover
- Delivery roller assembly

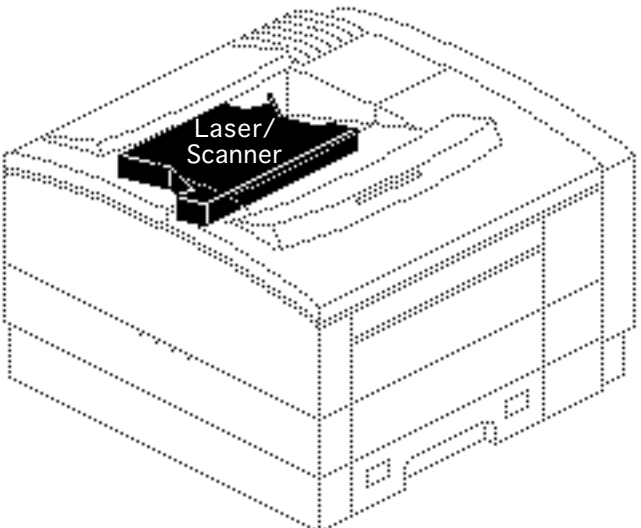
Note: The delivery/interlock sensor (PS201) senses closure of the fuser access door and the exiting of paper from the fuser assembly. See “Sensing System Theory” in Basics.



1 Disconnect the cable from the photo IC.



2 To remove the sensor holder from the printer, raise the upper edge and slide the holder upwards off the chassis.



Laser/Scanner Assembly

Before you begin, remove the following:

- Rear panel
- Top cover
- Delivery roller assembly

Warning: Review "LaserWriter Safety" in Basics before working with the laser/scanner assembly.

Note: The LaserWriter 16/600 PS laser/scanner assembly is available only as an integral assembly. No

subparts are available from Apple and no power adjustments are possible.

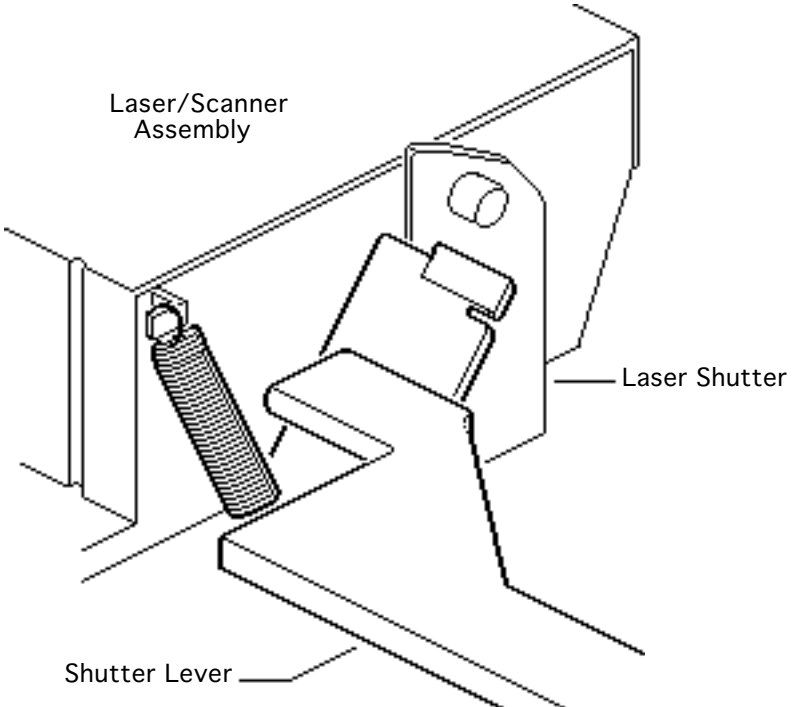
1 Remove the four cables from the cable clips and disconnect the cables at their connectors.

Note: There is no fiber-optic cable in the LaserWriter 16/600 PS. Beam detection circuitry runs through the BD IC unit at connector J731 (see “Wiring Diagram” in Troubleshooting Info).

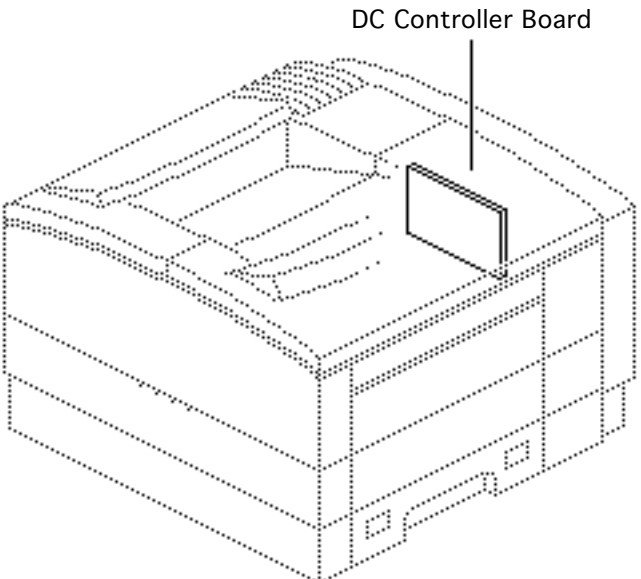
2 Remove the four screws and lift the laser/scanner assembly from the printer.

Note: Remove the shutter and the shutter spring prior to returning a laser/scanner assembly to Apple.

Replacement Note: Perform the “Registration Adjustment” procedure (see Adjustments chapter).



Replacement Note: Make sure that the shutter and the shutter lever are reinstalled in the position shown. Confirm installation by pushing the lever against the edge of the shutter. The shutter should open freely when actuated by the lever, and the shutter should spring back fully when you release it.



DC Controller Board

Before you begin, remove the following:

- Rear panel
- I/O board
- I/O shield

1 Disconnect J103 from the power supply.

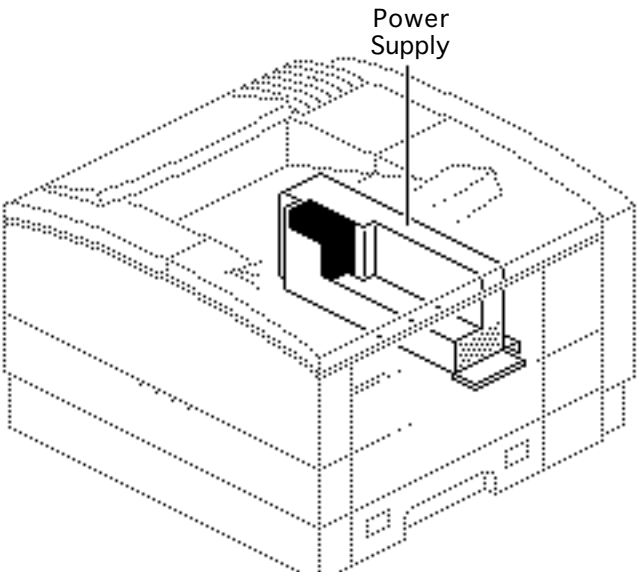
2 Remove the all cables except for the engine interface cable and power supply connector TB201.

Note: Do not attempt to remove connector TB201 from the DC controller board. Connector TB201 is hard-wired to the board.

3 Release the two flex tabs and pull the board out of the printer.

Replacement Note: Set the bottom edge of the board into the two mounts and then snap the top into place. Make sure that the positioning posts line up with the holes in the board.

Note: Perform the “Registration Adjustment” procedure (see Additional Procedures).



Power Supply

Before you begin, remove the following:

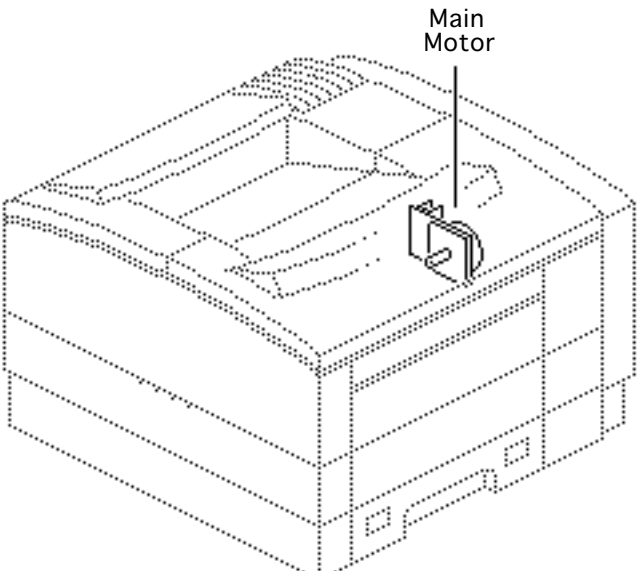
- Rear panel
- I/O board
- I/O shield

1 **Note:** Three screws secure the power supply to the chassis—one on the left side of the printer beneath the power inlet panel and two on the rear side.

Pull off the power inlet panel that covers the main power switch and remove the three screws.

2 **Note:** There is a receptacle on the rear face of the power supply. The receptacle mates with the high-voltage connector block and may cause slight resistance when you are pulling out the power supply.

Remove connectors J103 and J104 and pull out the power supply.



Main Motor

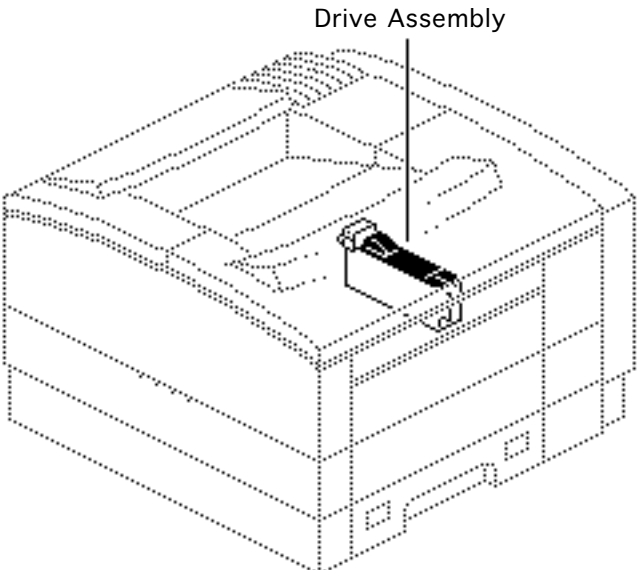
Before you begin, remove the following:

- Rear panel
- I/O board
- I/O shield
- Power supply

Note: The main motor is the motor mounted next to the DC controller board. The main motor powers the drive train from the toner cartridge forward through the delivery rollers. See “Mechanical Drive Theory” in Basics.

1 Remove the four brass colored screws that secure the motor to the printer chassis.

2 Disconnect J131 from the main motor board and pull out the main motor.



Drive Assembly

Before you begin, remove the following:

- Fuser assembly
- Rear panel
- I/O board
- I/O shield
- Power supply
- Main motor

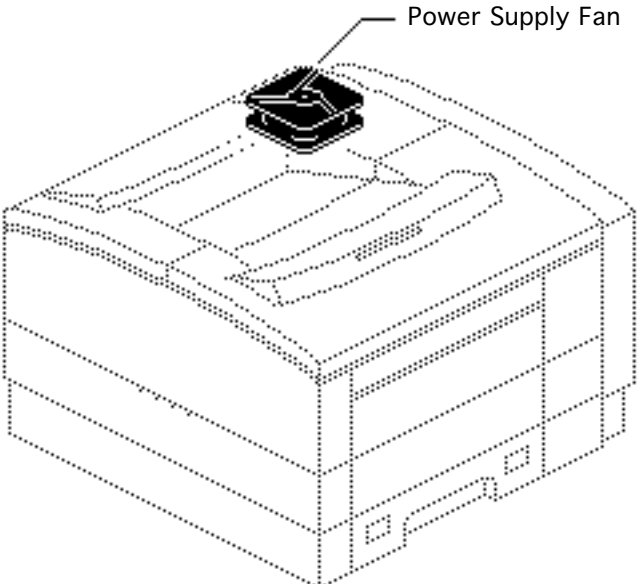
Note: The drive assembly receives drive from the main motor and transfers it forward to the fuser assembly gears. See “Mechanical Drive Theory” in Basics.

1 Remove the two small silver-colored screws on the rear face of the chassis that secure the drive assembly to the printer.

2 **Note:** The following step dislodges the positioning pins that seat into the chassis wall.

Grip the edge of the assembly housing with needlenose pliers and pull it about 1/4 inch away from the chassis wall.

3 Pull the drive assembly out the fuser side of the printer.



Power Supply Fan

Before you begin, remove the following:

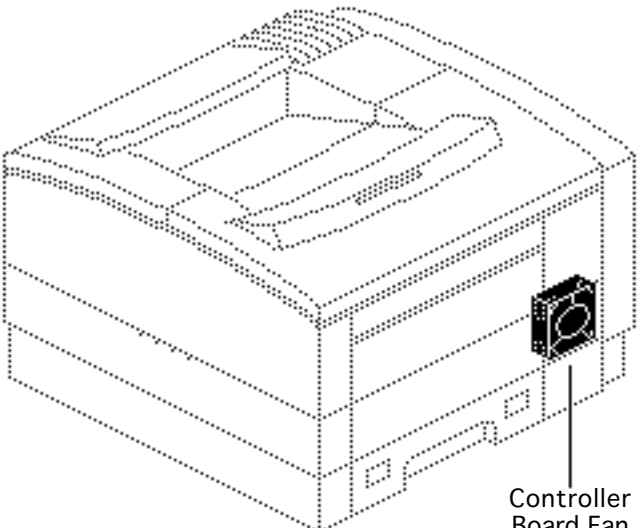
- Rear panel
- Top cover
- I/O board
- I/O shield
- Delivery roller assembly

1 Remove the single inch-long screw that connects the metal bracket to the fan and fan duct and lift off the metal bracket.

2 Disconnect J209 from the DC controller board.

3 Using a small flat-blade screwdriver, release the four tabs and lift the fan out of the printer.

Controller Board Fan



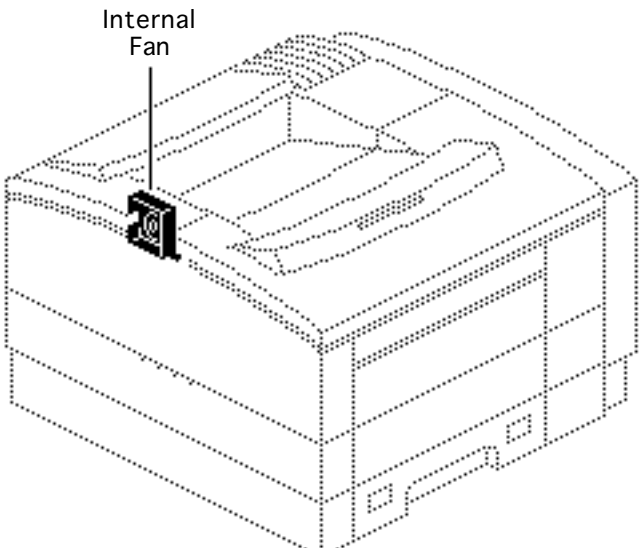
Before you begin, remove the following:

- Rear panel
- I/O board
- I/O shield
- Right corner panel

1 Remove the single inch-long screw that connects the fan to the metal chassis.

2 Disconnect J214 from the DC controller board, thread the cable through the fan bracket, and remove the fan from the printer.

Replacement Caution: Be sure to reinstall the fan with the label facing outward.



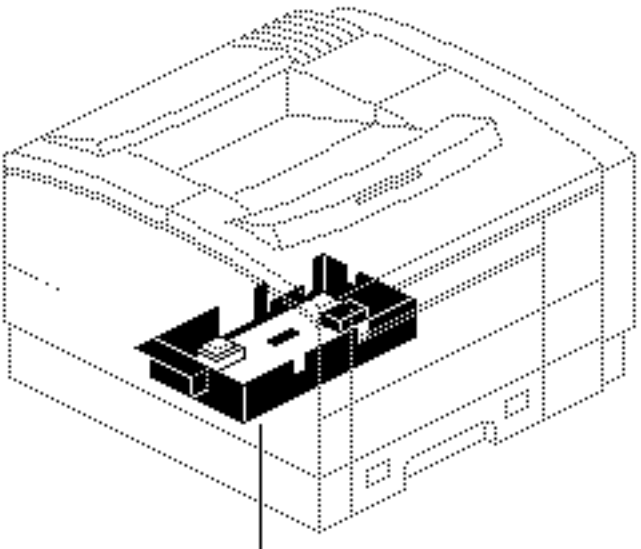
Internal Fan

Before you begin, remove the following:

- Rear panel
- I/O board
- I/O shield
- Top cover
- Delivery roller assembly

1 Remove the single screw that connects the fan to the metal chassis.

2 Disconnect J213 from the DC controller board, slide the slightly to the right, and remove the fan from the printer.



High-Voltage Power Supply

No preliminary steps are required before you begin this procedure.

Note: The high-voltage power supply receives power from the high-voltage connector block and transfers it into the toner cartridge through contacts TB401 to TB406.

Remove the high-voltage power supply from its tray before returning the high-

voltage power supply to Apple.

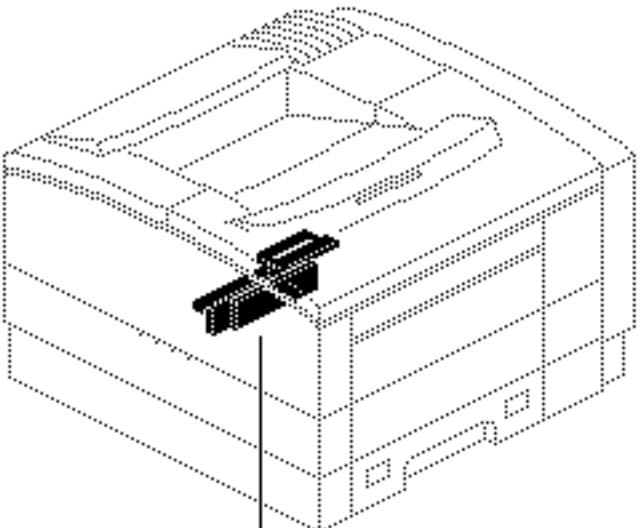
1 Turn over the printer.

2 Remove the two screws that secure the high-voltage power supply to the bottom chassis.

3 **Note:** There are three hidden contacts and a pin connector that mate with the high-voltage connector block. They may cause slight resistance when you are performing this procedure.

Release the two flex tabs and pull the high-voltage power supply out of the printer.

Replacement Note: Make sure that the contacts and connectors are firm. Run a service test page after replacing the high-voltage power supply. If you get a solid black page, you have probably not seated the high-voltage power supply correctly.



High-Voltage Connector Block

Before you begin, remove the following:

- Rear panel
- I/O board
- I/O shield
- Power supply
- Fuser door
- Fuser assembly
- High-voltage power supply

1 Remove the screw that secures the right cassettte guide to the fuser end of the printer.

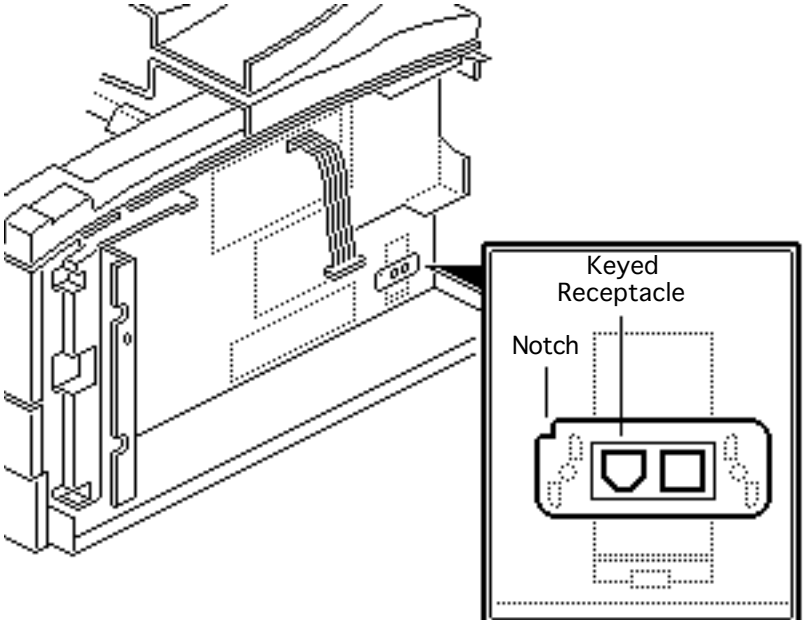
2 **Note:** The tab referenced in the following step is accessible from behind the rear wall of the chassis.

Release the single flex tab with your finger and shimmy the cassette guide off the printer.

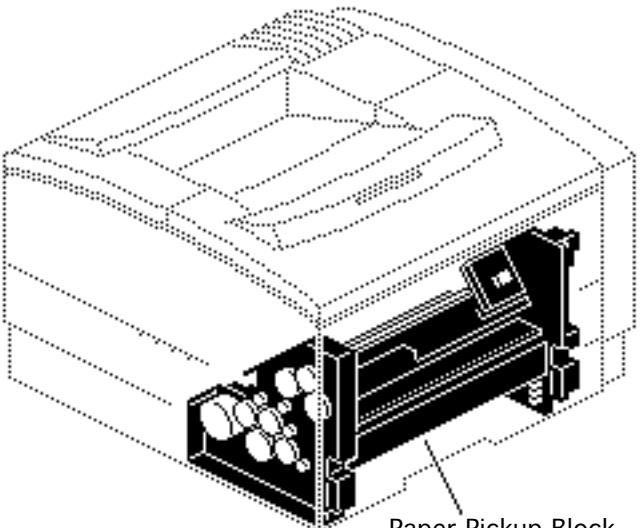
3 Disconnect J210 (the orange cabling) from the DC controller board.

4 Release the expansion posts behind the receptacle that is anchored into the chassis wall, detach the receptacle, and push the receptacle back through the chassis opening.

5 Release the flex tab near the cable tie and receptacle and remove the connector block from the printer.



Replacement Note: The cable receptacle is keyed and will not mate with the power supply if it is installed incorrectly. Looking from the rear of printer, with the printer sitting upright, the notched corner should be at the upper left.



Paper Pickup Block

Before you begin, remove the following:

- Rear panel
- Top cover
- Front panel
- Right corner panel
- Multipurpose tray assy
- Multipurpose closure panel

Note: Refer to the following take-apart topics for disassembly of the paper pickup block:

- Pickup Controller Board
- Pickup Sensor Board
- Pickup Block Motor
- Envelope Feeder Cable
- Sensor Holder Assembly
- Left Pickup Block Frame

Note: The paper pickup block is not available from Apple as an intact module.

1 Remove the three brass-colored screws on the front chassis.

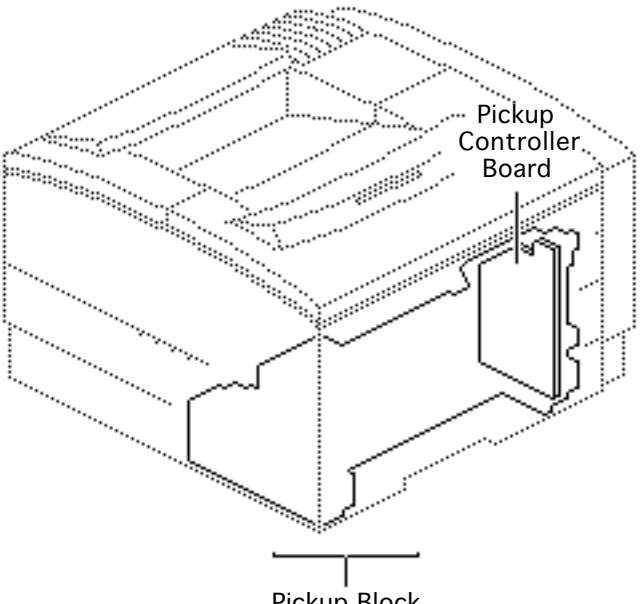
2 Remove the two screws that secure the lateral brace to the chassis and lift off the brace.

3 Remove the two screws that secure the right edge of the pickup block to the chassis.

4 Disconnect the two cables from the exposed edge of the pickup controller board.

5 Grasp the pickup block and slide it out of the printer.

Replacement Note: Perform the “Registration Adjustment” procedure (see Adjustments chapter).



Pickup Controller Board

Before you begin, remove the following:

- Rear panel
- Top cover
- Front panel
- Right corner panel
- Multipurpose tray assy
- Multipurpose closure panel
- Paper pickup block

Note: Control of the following parts either routes through or is located on the pickup controller

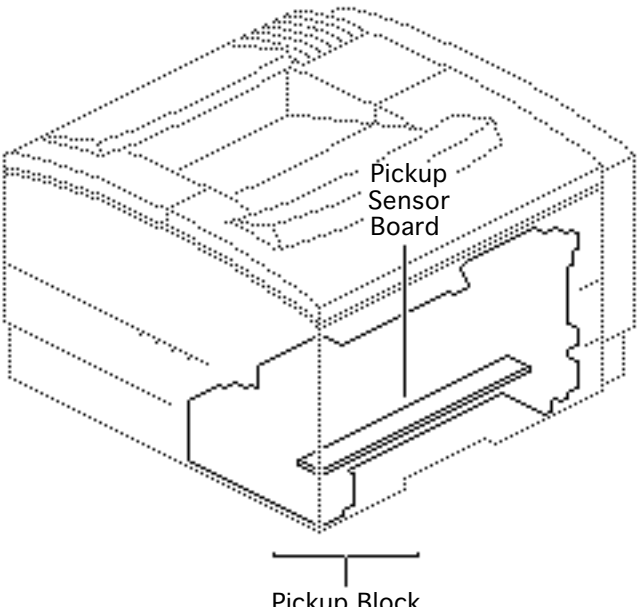
board:

- Pickup sensor board
- Pickup motor and drive gears
- Top cover interlock switch
- Service test page button
- Cassette and envelope feeders
- Cassette microswitches
- Cassette paper sensor

1 Disconnect the two cables and remove the two screws that secure the board to the pickup block.

2 **Caution:** The top cover interlock actuator is not attached to anything. Once you remove the board, the actuator can fall out and is difficult to find.

Release the tabs from top to bottom and pull out the board. There is a pin connector on the hidden face of the board that may cause slight resistance as you remove the board.

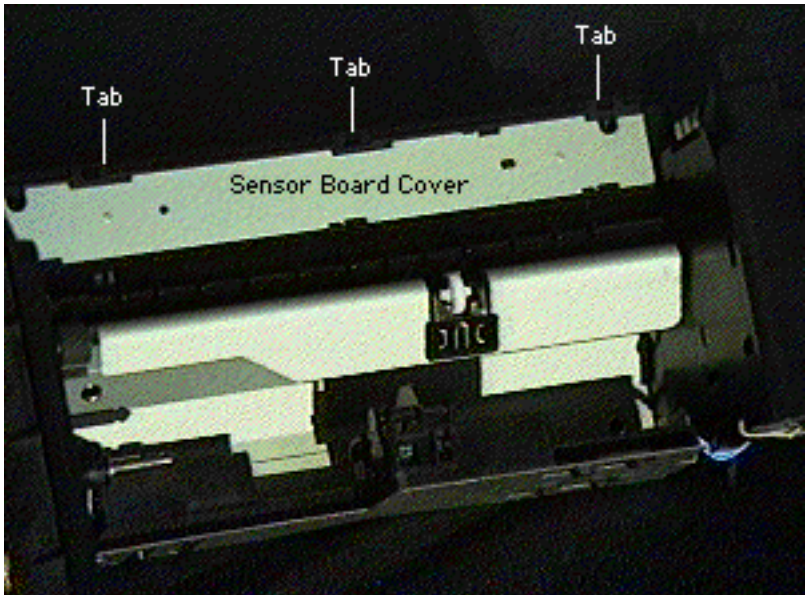


Pickup Sensor Board

Before you begin, remove the following:

- Rear panel
- Top cover
- Front panel
- Right corner panel
- Multipurpose tray assy
- Multipurpose closure panel
- Paper pickup block
- Pickup controller board

Note: Control of the following parts either routes through or is located



on the pickup sensor board:

- Multipurpose feed sensor
- Cassette feed sensor
- Pickup motor and drive gears
- Pickup solenoids

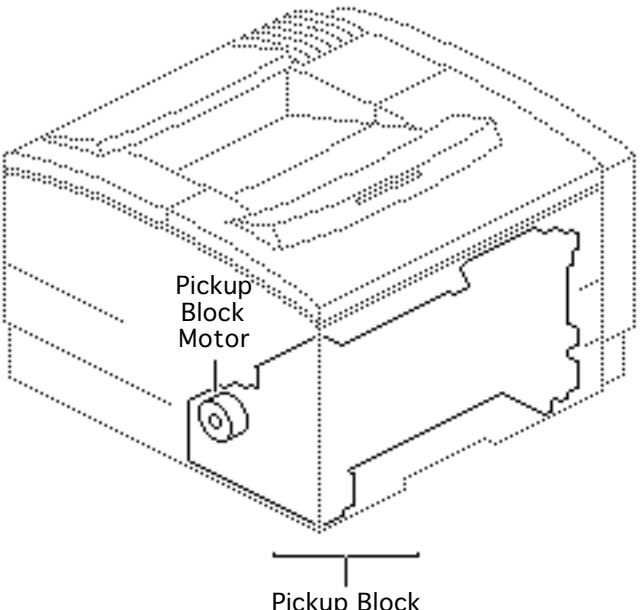
1 Turn over the pickup block so that it is resting on the 45° face of its end frames.

2 Unhook the three tabs and snap off the sensor board cover.

3 Disconnect the three cables at the gear end of the board.

4 **Note:** In the following instruction, “left” is the gear end and “right” is the controller board end of the pickup block.

Raise the board slightly to clear the two positioning pins, shift it about 1/2 inch to the left, rotate the right end upward, and remove the sensor board from the paper pickup block.



Pickup Block Motor

Before you begin, remove the following:

- Rear panel
- Top cover
- Front panel
- Right corner panel
- Multipurpose tray assy
- Multipurpose closure panel
- Paper pickup block

Note: The pickup block motor is the motor mounted in the left pickup block frame. The pickup block

motor powers the drive train from paper pickup forward to the toner cartridge. See “Mechanical Drive Theory” in Basics.

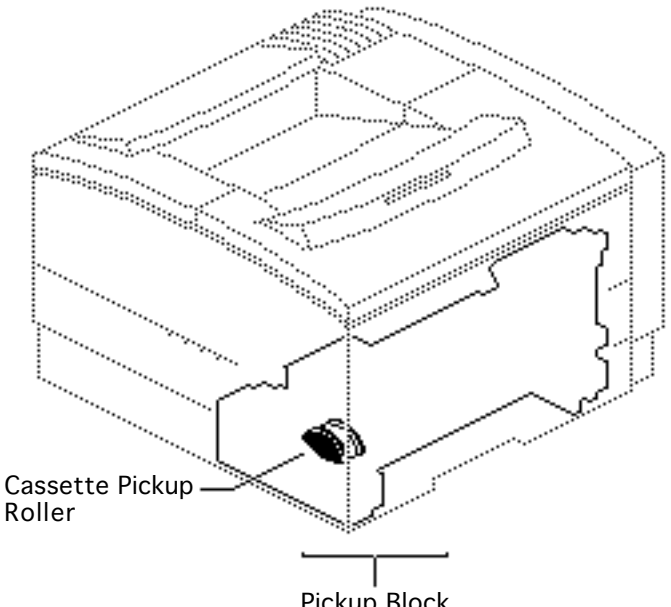
1 Disconnect the middle cable from the pickup sensor board.

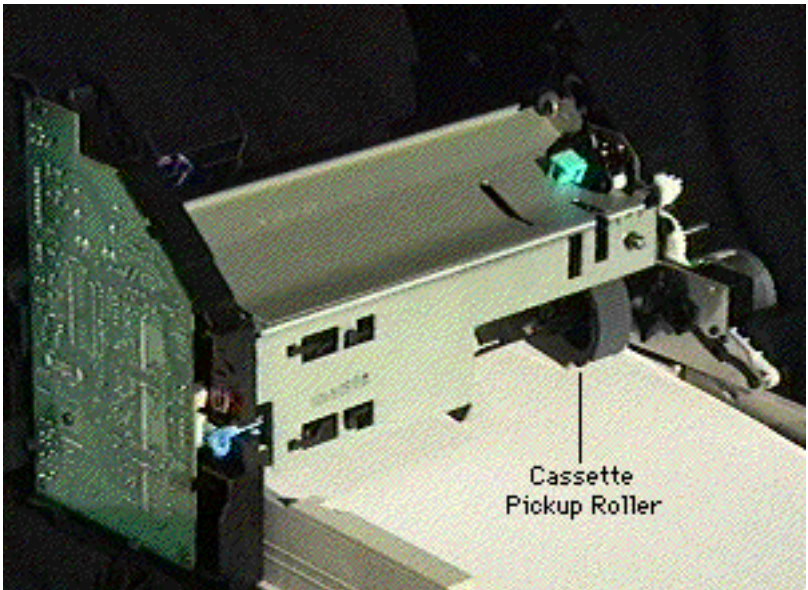
2 Remove the pickup block motor cabling from the entire length of its retaining channel.

3 Remove the two long brass-colored screws that secure the motor to the pickup block and lift out the motor.

Cassette Pickup Roller

No preliminary steps are required before you begin this procedure.

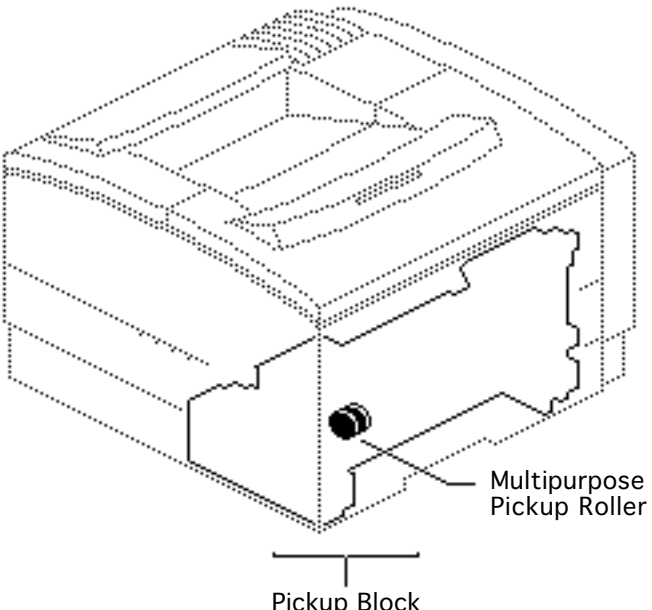




1 Turn over the printer and locate the cassette tray pickup roller.

2 Squeeze the spring release at the end of the roller shaft and slide off the pickup roller.

Replacement Note: Make sure that the roller slides all the way in on the shaft and locks into place.



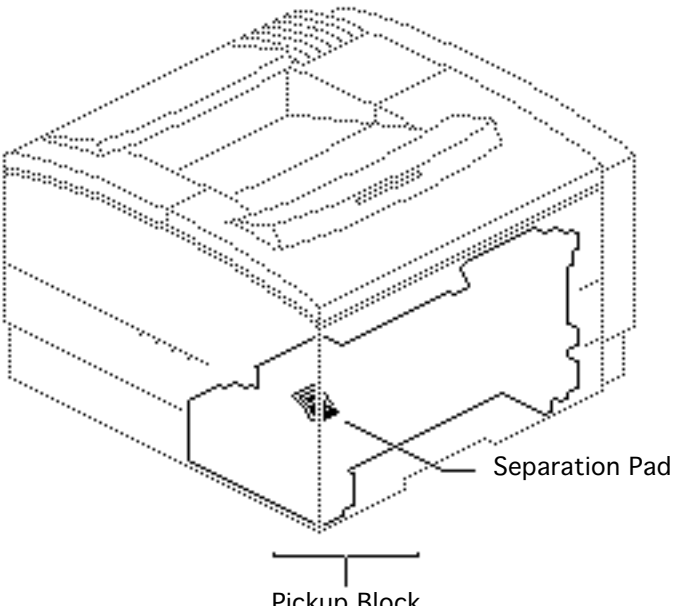
Multipurpose Pickup Roller

Before you begin, remove multipurpose closure panel.

1 Squeeze the spring release at the end of the roller shaft and slide off the pickup roller.

Replacement Note: Make sure that the roller slides all the way in on the shaft and locks into place.

Separation Pad

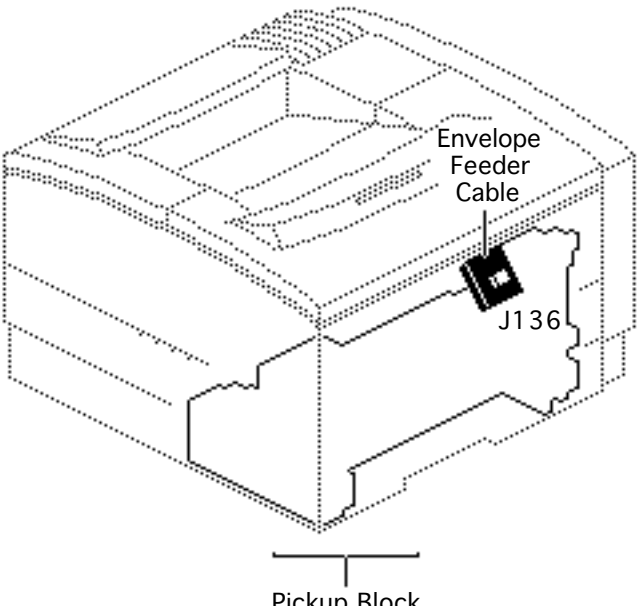


Before you begin, remove the following:

- Multipurpose closure panel
- Multipurpose pickup roller

Note: The separation pad is available as a part of the multipurpose tray guide assembly (P/N 922-0286). Remove the separation pad from the new tray guide assembly and install it in the printer.

1 Using a small flat-blade screwdriver, pry underneath the bottom edge of the separation pad and remove the pad.



Envelope Feeder Cable

Before you begin, remove the following:

- Rear panel
- Top cover
- Front panel
- Right corner panel
- Multipurpose tray assy
- Multipurpose closure panel
- Paper pickup block
- Pickup controller board

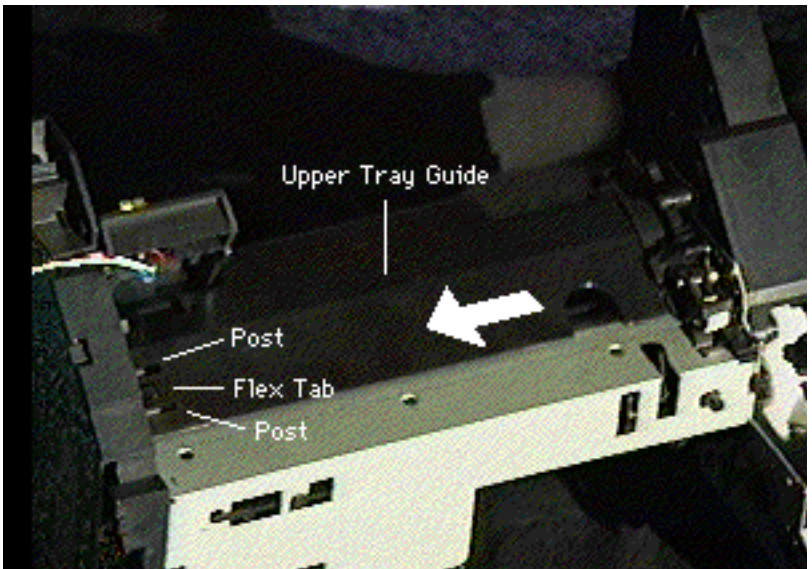
1 Remove the cabling from the entire length of its retaining channel in the right pickup block.

Note: If you are replacing the feeder cable without replacing the feeder cable mount, skip to step 7.

2 **Note:** The opening guide is the rounded metallic plate with the green knob at its far end. The opening guide hinges around a ring connection at the knob end and an open grip connection at the near end.

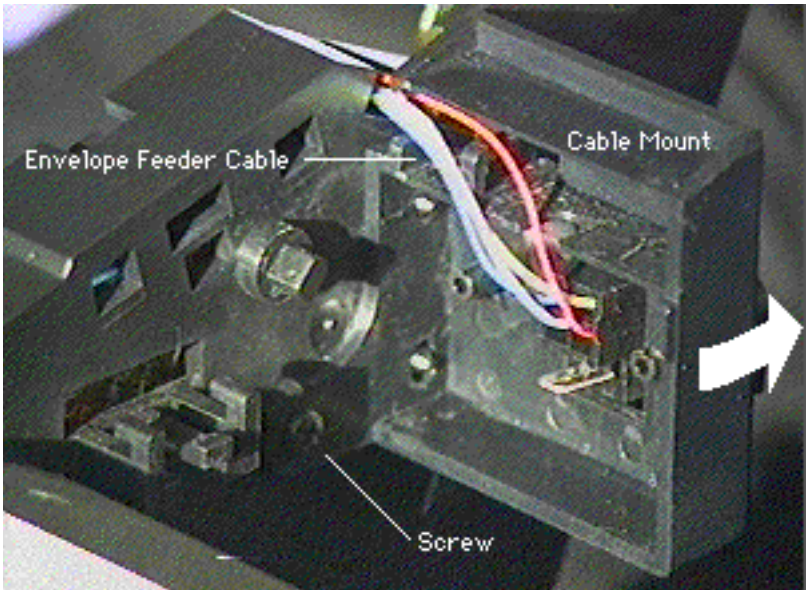
Swing the opening guide upward about 90°, free the grip connection, and pull the guide up and out of the pickup block.

3 Disconnect the grounding spring from the pickup block.



4 **Note:** The upper tray guide is the black piece below the opening guide. It has a rounded cutout on its far side that serves as a grip point for the step below. A flex tab and two posts are located at the controller end of the upper tray guide.

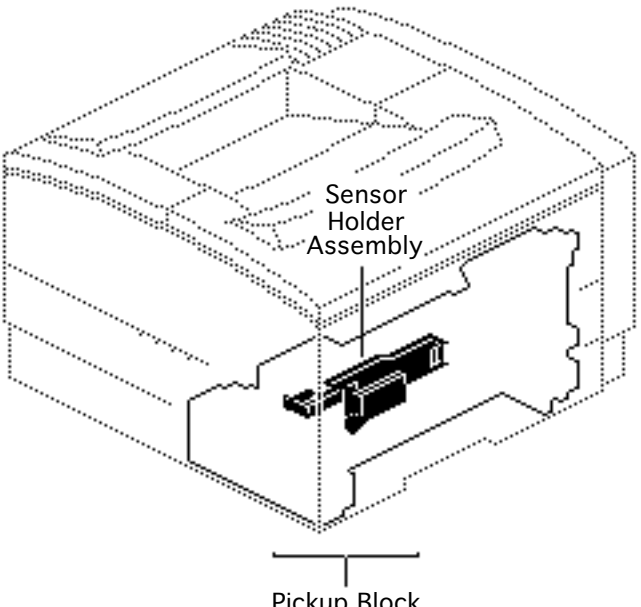
Release the flex tab, shift the upper tray guide to clear the posts, and lift the guide out of the pickup block.



5 Remove the screw that secures the cable mount to the pickup block frame.

6 Rotate the cable mount outward to free the two mounting tabs and remove it from the pickup block.

7 Release the expansion posts behind the receptacle and remove the envelope feeder cable from the cable mount.



Sensor Holder Assembly

Before you begin, remove the following:

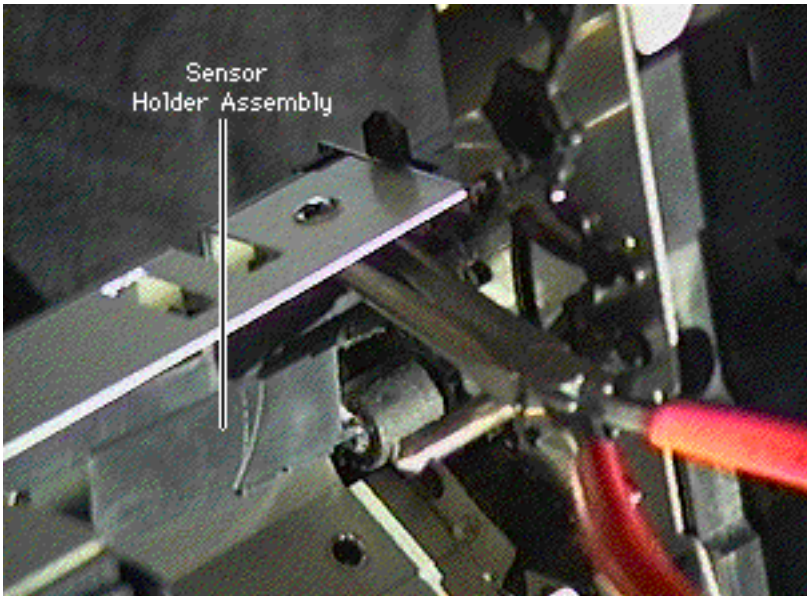
- Rear panel
- Top cover
- Front panel
- Right corner panel
- Multipurpose tray assy
- Multipurpose closure panel
- Paper pickup block
- Cassette pickup roller

Note: The sensor holder assembly contains the cabling, actuators, and photo

interrupters for cassette paper sensor PS601 and registration paper sensor PS602.

1 Rest the entrance side of the pickup block flat on your work surface.

2 Disconnect J605 from the pickup controller board.

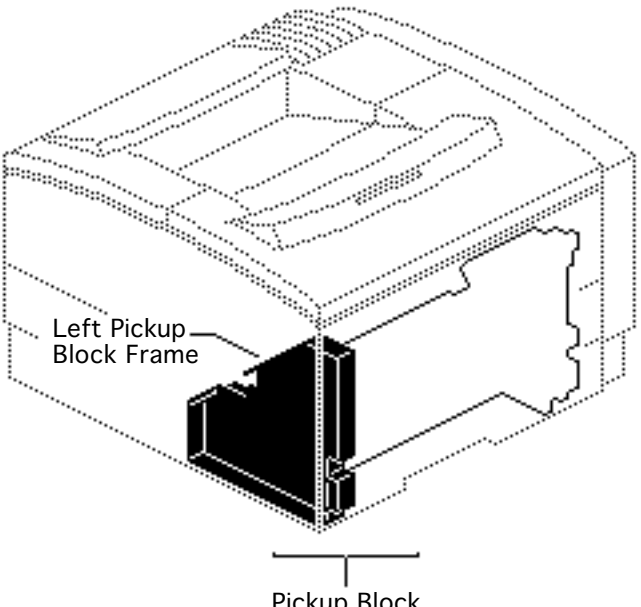


3 **Note:** The sensor holder assembly is held in place by a positioning post at the far end and two pairs of tab connectors at the near end.

Press the positioning post through the metal flange and grasp the throat of the pin with needlenose pliers.

4 **Note:** Pull the sensor holder assembly toward the gear end of the pickup block while you perform the following step.

Release the two tabs, unmount the holder assembly, and shimmy it out of the pickup block.



Left Pickup Block Frame

Before you begin, remove the following:

- Rear panel
- Top cover
- Front panel
- Right corner panel
- Multipurpose tray assy
- Multipurpose closure panel
- Paper pickup block

Note: Removal of the left frame is necessary only if you need to get to some of the components on the inside

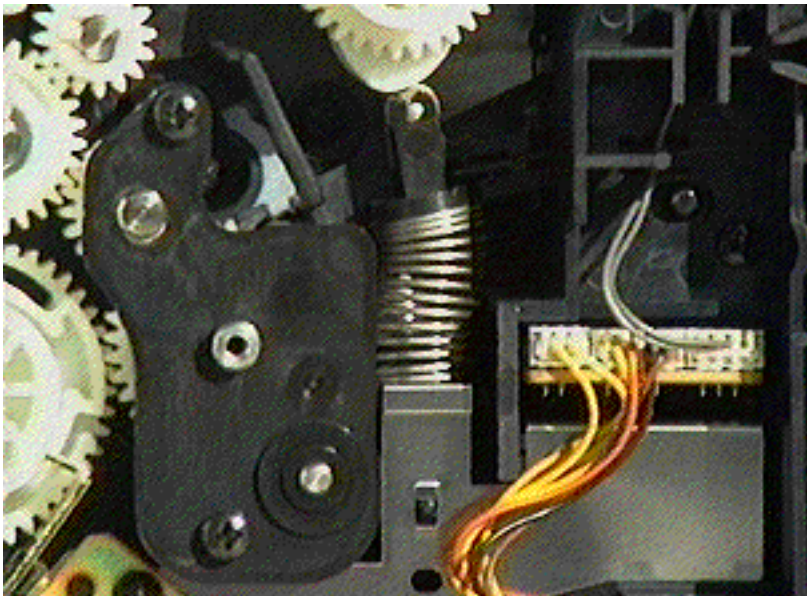
face of the frame, such as the feed rollers, gear mount, or the sensor arm. You must also remove the left frame to get the paper guide plate and its spring out of the pickup block. The Take Apart procedures do not address disassembly beyond this topic.

1 Set the pickup block on end with the left frame up.

2 Remove the two black and two silver-colored screws that connect the frame to middle components.

3 Lift the left frame straight up and off the pickup block.

Note: The inside of the frame is now accessible for further troubleshooting or take apart

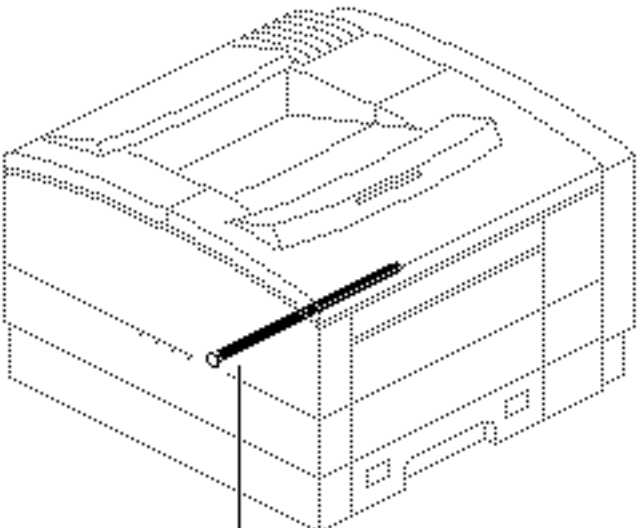


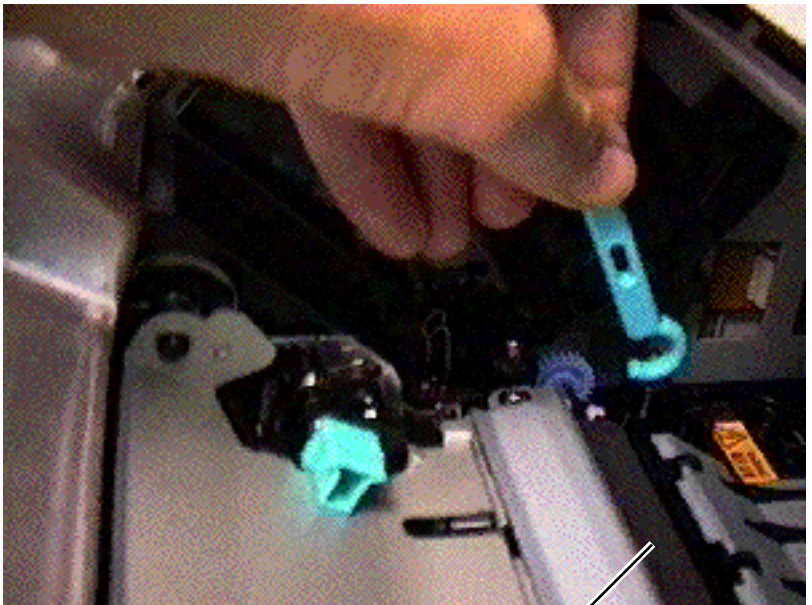
Replacement Note: The key step in reassembly is correctly installing the paper guide plate and its spring. The guide plate presses against the gear that drives the multipurpose pickup roller. If the plate does not press against this gear, the pickup roller will either slip or remain in neutral and no paper will be pulled into the printer from the multipurpose tray. Your drum shaft end plate may differ from what is shown.

Reinstall the lower guide (the flexible guide with ribs) after the pickup block is intact. Temporarily loosen the four screws on the right block frame and release the frame about 1/8 inch to allow for the reseating of the lower guide.

Transfer Roller

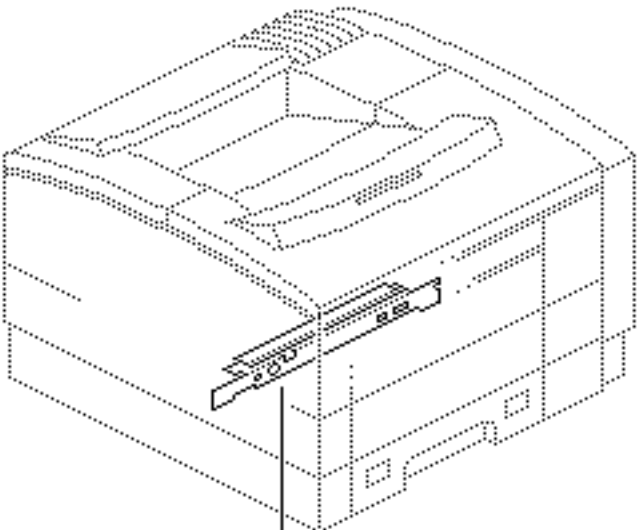
No preliminary steps are required before you begin this procedure.





1 Hook the left end of the roller with the green cleaning brush and pull the roller out of the printer.

Replacement Note: Slide the right end of the roller into the slot and lower the gear end into place.

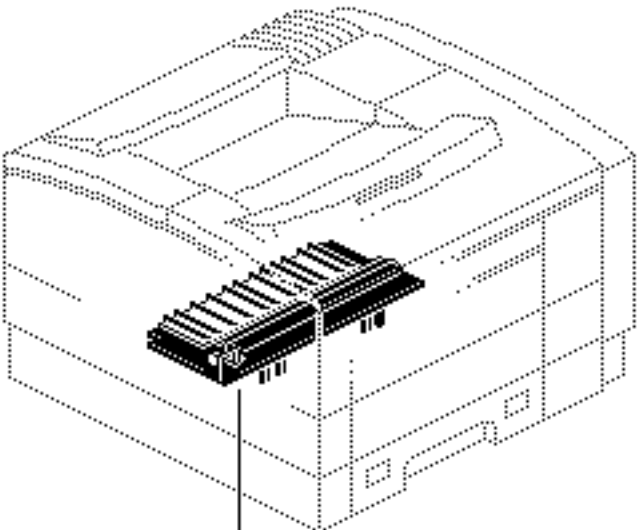


Transfer Guide Assembly

Before you begin, remove the following:

- Rear panel
- Top cover
- Front panel
- Right corner panel
- Multipurpose tray assy
- Multipurpose closure panel
- Paper pickup block

1 Remove the two black screws that secure the transfer guide assembly to the toner cartridge guides and pull the transfer guide assembly out the right side of the printer.



Transfer Block Assembly

Before you begin, remove the following:

- Rear panel
- Top cover
- Front panel
- Right corner panel
- Multipurpose tray assy
- Multipurpose closure panel
- Paper pickup block
- Transfer guide assembly
- Fuser assembly

1 For clearance purposes, loosen the nine silver-colored screws and the one upper black screw about 1/8 inch and shift the front wall outward.

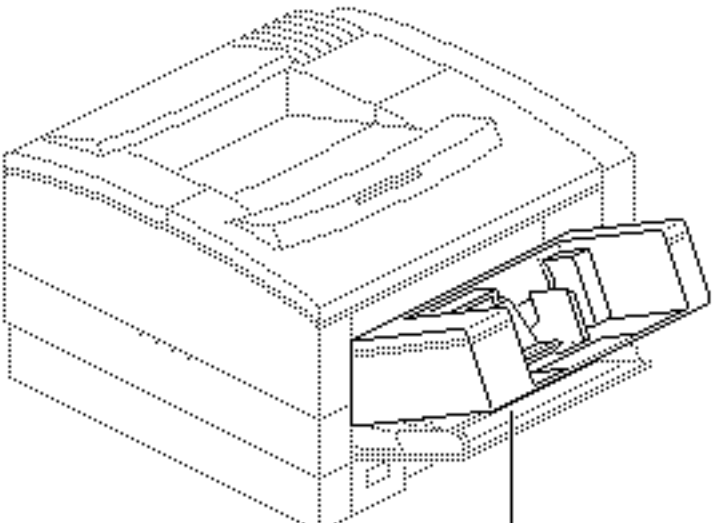
2 Remove the screw facing out through the fuser door that secures the feeder guide to the chassis.

3 Pry under the toner-side edge of the assembly with a small flat-blade screwdriver and release the five tabs that secure the transfer block assembly to the chassis.

4 **Note:** The underside of the transfer block assembly has several contact pins that extend down into the high-voltage power supply and tend to snag during removal. Be careful not to damage them as you perform the following step.

Lift the assembly straight upward about 2 inches and shimmy it out the toner side of the printer.

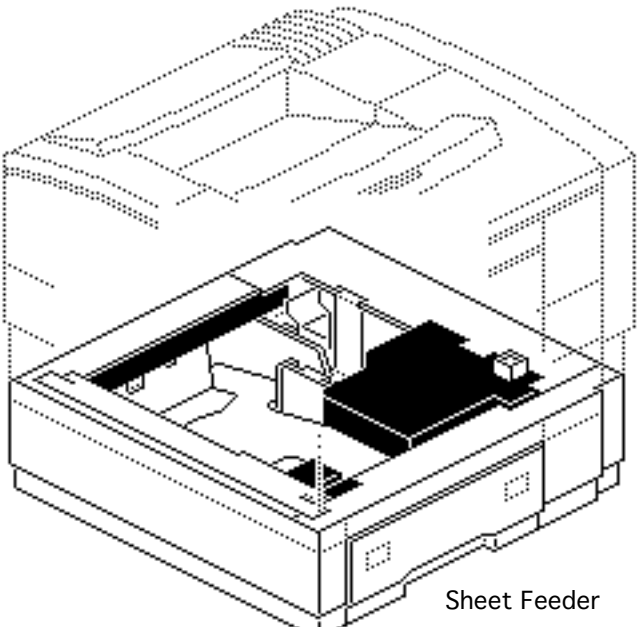
Envelope Feeder



Before you begin, remove the multipurpose closure panel.

Note: Refer to the Envelope Feeder LW Pro-LW 16/6 manual for further information.

1 To install the envelope feeder, turn off the printer, slide the feeder into the paper pickup block, and turn on the printer.



Sheet Feeder

Sheet Feeder

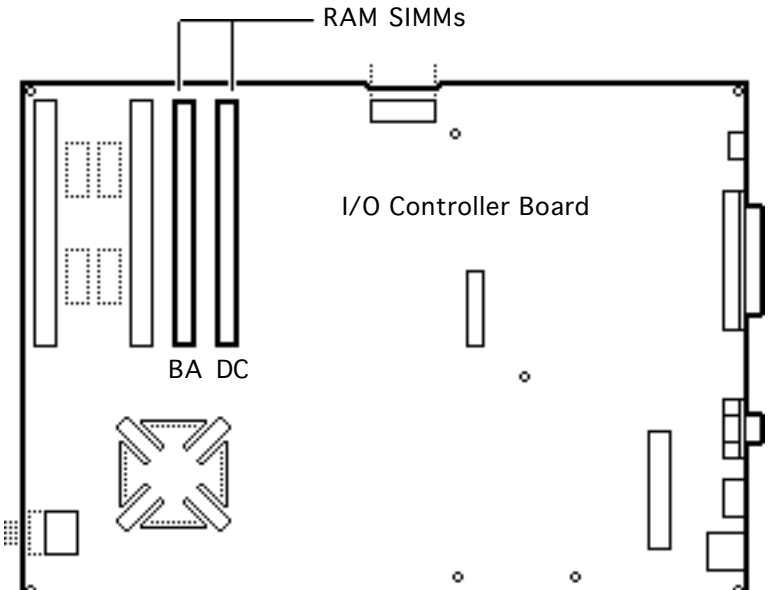
No preliminary steps are required before you begin this procedure.

Note: Refer to the Sheet Feeder LW Pro-LW 16/6 manual for further information.

1 To install the sheet feeder, turn off the printer, place the printer in position over the feeder and lower the printer into position. Then turn on the printer.

Upgrades

LaserWriter 16/600 PS



Upgrading RAM

There are two RAM SIMM slots on the LaserWriter 16/600 PS I/O controller board, slot BA on the left and slot DC on the right.

The printer comes with 8 MB of RAM installed in slot BA. You can increase the printer memory to a total of 32 MB by installing RAM SIMMs in one of the configurations shown on the next page.

Caution: The SIMMs are very susceptible to ESD damage. To prevent damage, wear a grounding wriststrap. Review the ESD precautions in Bulletins/Safety.

Table 1: RAM Configurations

Total	Slot BA	Slot DC	Note
8 MB	8 MB	(empty)	b
12 MB	8 MB	4 MB	c
16 MB	8 MB	8 MB	
24 MB	16 MB	8 MB	d
32 MB	16 MB	16 MB	e

a No other configuration is supported. If you try to install a (16 + 0 = 16) or (16 + 4 = 20) configuration, for example, you are likely to

receive an engine error when you start up the printer.

b This is the standard, as-shipped configuration.

c The is the minimum configuration to enable PhotoGrade.

d Note that this configuration requires moving the base 8 MB SIMM from the left to the right SIMM socket. Due to mechanical constraints, the left SIMM should always be installed before the right SIMM is installed.

e Return the original 8 MB SIMM to the customer.

f See next page for RAM specifications.

RAM SIMM Specifications

Length: 107.95 mm ± 0.20 mm (4.25 in. ± .008)

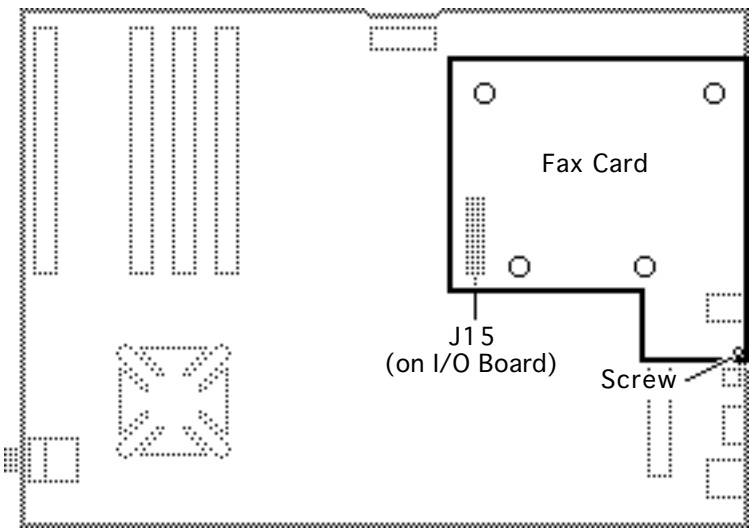
Height: 25.53 mm (1.005 in.) maximum

4 MB SIMM:
1 Mbit x 32 bit (one 4 MB bank)
80 ns or less
72-pin

8 MB SIMM:
2 Mbit x 32 bit (two 4 MB banks)
80 ns or less
72-pin

16 MB SIMM:
4 Mbit x 32 bit (one 16 MB bank)
80 ns or less
72-pin

Note: 16 MB SIMMs must have a 2 KB row (11 bit x 11 bit) refresh configuration. 16 MB SIMMs with a 4 KB row (10 bit x 12 bit) refresh configuration are not compatible with this printer.



Ghosted image is outline of I/O controller board.

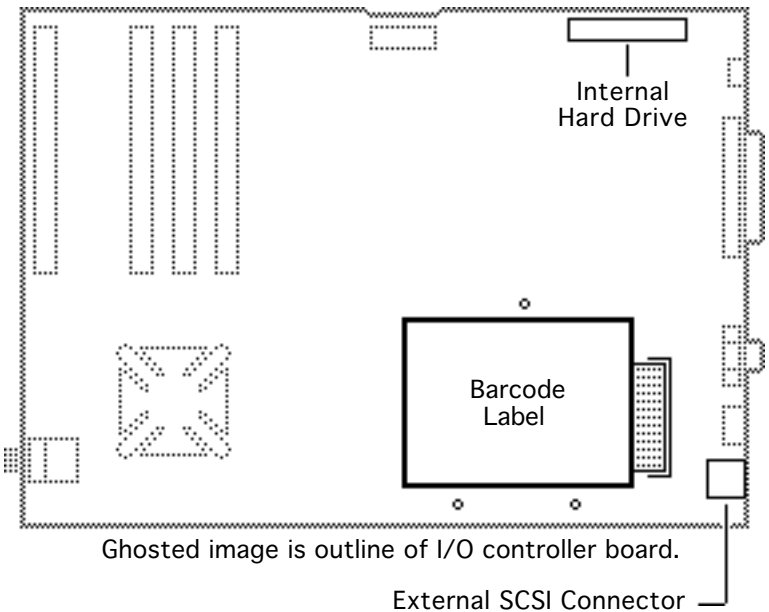
Adding a Fax Card

There are two fax cards available for the LaserWriter 16/600 PS, one for USA and one international. Install the fax card in accordance with the instruction in the user guide.

The fax card mates into connector J15 on the I/O board. One screw connects the fax card to a sheet metal flange on the I/O shield. The fax port aligns with a pinout opening in the I/O shield.

The domestic fax card has an on-board modem and an RJ-11 phone net port for direct connection into phone lines. The finished goods part number for the domestic fax card is M3298LL/A.

The international fax card has a serial port for direct connection into an external modem. The finished goods part number for the international fax kit is M3299*/A.



Adding Hard Drives

You can install one internal hard drive and attach up to six external SCSI hard drives to the LaserWriter 16/600 PS.

Internal hard drives

You can purchase an optional internal SCSI hard drive for the LaserWriter 16/600 PS. The finished goods part number for the internal hard drive is M3297G/A.

The internal drive mounts directly onto the printer's I/O board using the three captive screws attached to the carrier.

Note: When installing the hard drive, check the I/O serial number on the yellow barcode label in the upper right-hand corner of the I/O controller board. If the last four characters of the number are "34AA," do not install the hard drive and return the I/O controller board to Apple. If the last four characters are not 34AA," continue installing the hard drive according to the instructions that come with the hard drive kit.

External hard drives

You must use an HDI-30 SCSI System cable and SCSI terminator to connect a hard drive to the printer. The terminator can be either black or gray. Each SCSI device connected to the printer must have a different number. Do

not use SCSI ID #7 or ID #0.

Caution: External hard drives must supply 5 volts DC to the SCSI bus to work properly. Check the documentation that came with the hard drive for information about SCSI voltage.

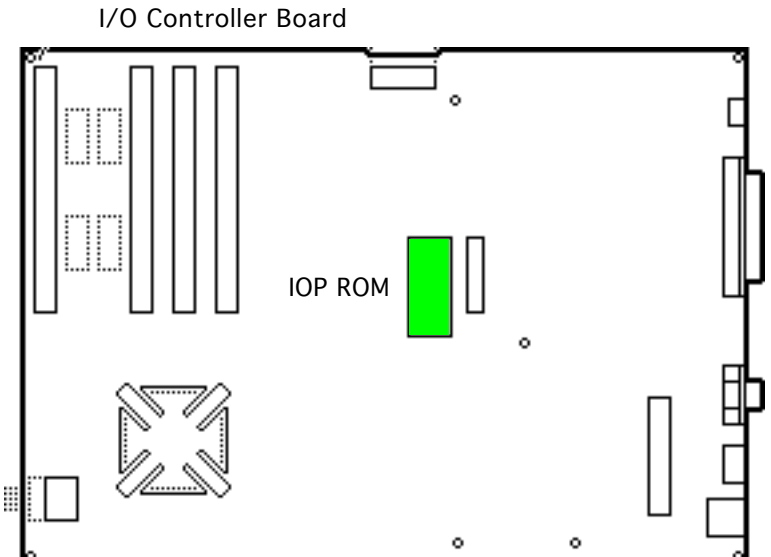
The printer will not recognize any attached drive unless the drive is turned on before or at the same time that you start up the printer. If a hard drive is left off, the printer will detect an error and will not start up.

Previously used drives

The LaserWriter 16/600 PS will not recognize any disks that have been formatted for use with a different model of LaserWriter or Macintosh. If you attach such a drive to the printer, you must reinitialize the drive before you can use it and then reload any fonts from your computer.

Note: You must initialize hard drives with the Apple Printer Utility (for Macintosh) or the Font Downloader in the Printer Setup dialog box (for Windows). If your computer communicates with the printer via DOS or a UNIX network, refer to the LaserWriter 16/600 PS user manual.

IOP ROM v. 3.0

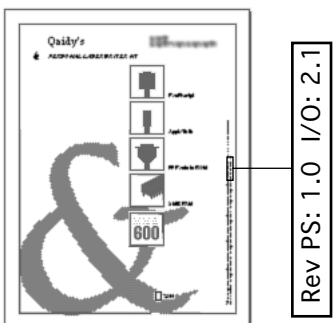


Several network-oriented symptoms are addressed by version 3.0 of the Input/ Output Processor (IOP) ROM. This ROM is available as P/N 922-2458.

Note: Version 2.0 of the IOP ROM has been discontinued. All fixes associated with that version are present in v3.0.

Note: The LaserWriter 16/600 PostScript ROMs are not affected by this IOP upgrade. The current version is v1.0.

Determining IOP ROM Version



Along the right edge of the startup page is a small line of text that reads **Rev PS: 1.0 I/O: XX**. The number represented here as XX is the version of IOP ROM currently installed in that printer.

Symptoms Associated with IOP ROM

Ethernet lockups

In version 1.0 of the IOP ROM, reception of an illegally sized packet greater than 1518 bytes caused the IOP to stop responding to network traffic. (Restarting the printer may temporarily resolve this problem.) This problem was resolved in IOP v2.0 and later.

Customers should upgrade their IOP ROM to v3.0.

AppleTalk problems

The following problems have been fixed with version 3.0 of the IOP ROM.

- The printer's EtherTalk stack stops responding during or after a broadcast storm (i.e. the printer disappears from the EtherTalk network even though TCP/IP and IPX continues to function.)
- Helios EtherShare Print Server does not print with the EtherShare Accounting feature on.
- The printer registers on the network with an enumerated name even if there were no other printers in that zone with the same name. This was caused by the printer temporarily registering in the default zone (where a similarly named printer does exist) prior to registering in its proper zone.
- The printer appears in a different zone than the one set with the Apple Printer Utility. This was caused by the

printer accepting and storing in NVRAM an invalid ZIP GetNetInfo response. It no longer stores this value in NVRAM. If the connection with the router is lost and current zone is the default, the printer will return to the zone stored in NVRAM as set by the Apple Printer Utility.

- EtherTalk now stores its current network number in VRAM and uses this number as its first guess on startup.
- On very slow WAN network links, connections may have timed out.
- The error recovery algotithm for Open Connection transactions has been enhanced.

The Apple LaserWriter 16/600 PS can be seen in the Chooser, but you cannot print to it.

Restarting the printer may temporarily resolve this issue. Please note that the printer may require another solution instead, as similar symptoms may be caused by some versions of printer drivers or routers. If the problem persists after restarting the printer, try the following:

- The symptom may be caused by earlier versions of the LaserWriter 8.x drivers. Upgrade to LaserWriter 8.2.2 or later driver software.
- Similar symptoms are caused by a Name Binding Protocal (NBP) gleaning bug in some routers, including Cisco routers and the Apple Internet Router 3.0. To work around this problem with Cisco routers, upgrade the Cisco software to v10.2 or later or turn NBP gleaning off. To work around this problem with an Apple Internet Router, update the Ethernet driver with Network

Software Installer 1.5 or later. Both these routers induce the symptoms only under specific circumstances.

Note: LaserWriter driver or gleaning bugs are not specific to the LaserWriter 16/600 PS printer. Other printers or devices may also be affected.

If none of the suggestions above is effective, upgrade the IOP ROM to v3.0.

The LaserWriter 16/600 PS is not visible on networks routed by Dayna PathFinder Routers.

This symptom is caused by the LaserWriter 16/600 PS booting with a source network of 1 and the PathFinder not asserting itself to tell the printer what network range it should be in (most likely a number other than 1). In turn, the PathFinder won't respond to the printer's request for zone information, resulting in devices not being able to locate the printer.

Other symptoms may occur when multiple routers exist in addition to the Dayna PathFinder (including not being able to locate the printer in the Chooser, not being able to open a connection with the Chooser, and receiving PostScript errors when printing). A network trace may reveal that the PathFinder is not responding to the printer's Zone Information Protocal/Get Net Info (ZIP GNIs).

The symptoms above are addressed in the v3.0 IOP ROM. Service Providers should replace the ROM.

The LaserWriter 16/600 PS is slow when using Farallon PhoneNET Star Controllers.

When a LaserWriter 16/600 PS is connected to a Farallon PhoneNET StarController, print jobs sent to the printer take a long time to print (typical) or may fail (rare) with PostScript errors. The reason for this symptom is that the LaserWriter 16/600 PS begins transmitting prematurely after receiving the Star Controller's LocalTalk Link Access Protocal (LLAP) packet.

This symptom is addressed in the v3.0 IOP ROM. Service Providers should replace the ROM.

IOP Does Not Close Jobs Correctly

The IOP does not close jobs correctly (e.g., when a PostScript error is encountered) without an End of File (EOF) message; a second job following the first gets flushed by the PostScript interpreter (to the second job's EOF), so neither the first job having the error nor the second job prints. A third job will print fine.

This symptom is addressed in the v3.0 IOP ROM. Service Providers should replace the ROM.

Symptoms Not Associated with IOP ROM

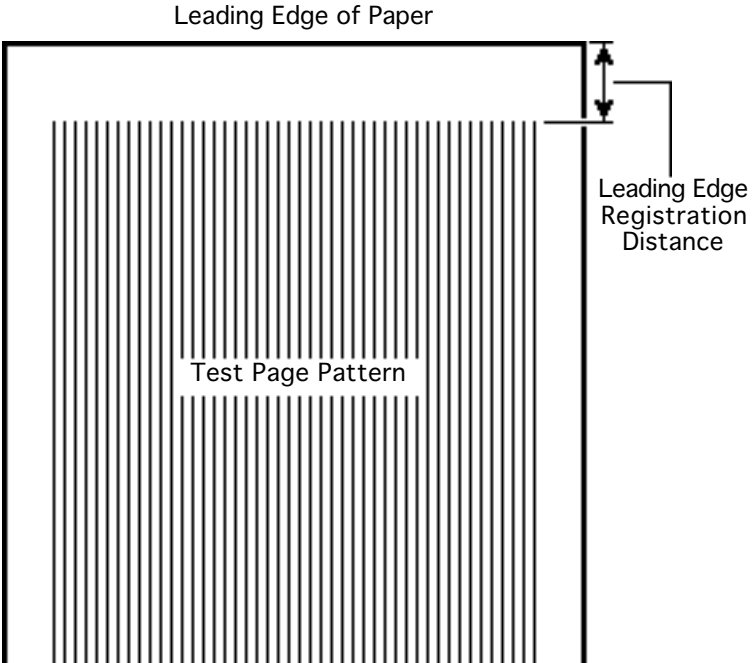
Note: The following issue is **not** related to the IOP ROM.

The LaserWriter 16/600 PS returns to the default zone after being turned on.

The configuration switch on the LaserWriter 16/600 PS must be in the up position if you want zone changes made with the Apple Printer Utility to be persistent across power cycles.

Adjustments

LaserWriter 16/600 PS



Registration Adjustment

Before you begin, remove the following:

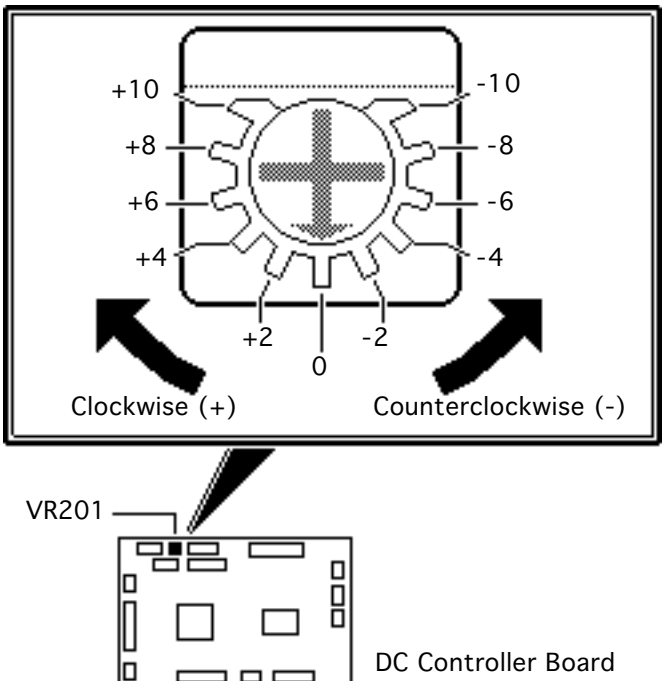
- Rear panel
- Top cover

You must perform the registration adjustment procedure whenever you replace the DC controller board, paper pickup block, or the laser/scanner assembly.

The DC controller board calculates registration based

on input from registration paper sensor PS602 (see “Sensing System Theory” in Basics) and adjustments made to varistor VR201 on the DC controller board.

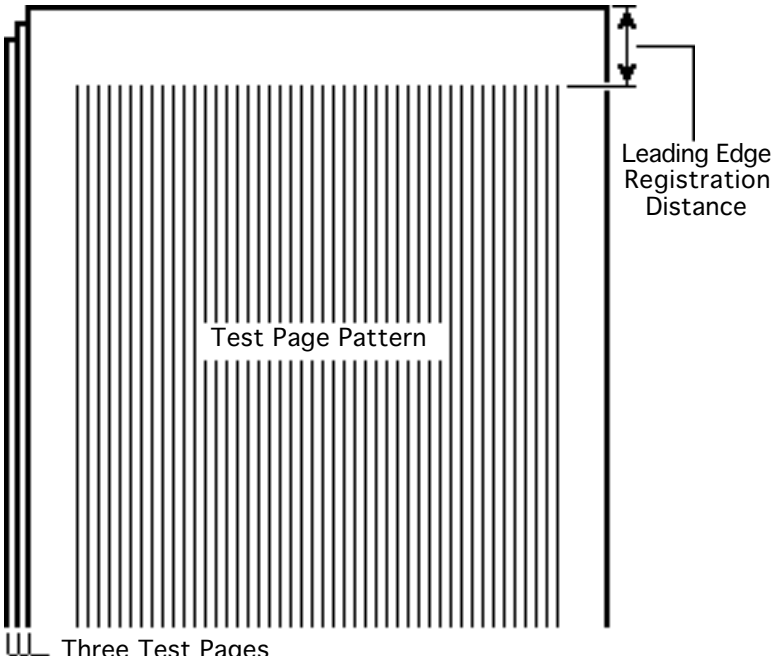
Optimum leading edge registration distance is 2 mm.



1 Using a jeweler's screwdriver, reset VR201 on the DC controller board to "0."

2 Switch on the printer and wait for the printer to warm up.

3 Press the service test page button three times to make three service test pages.



4 Measure the distance from the top of each page to the edge of the printed test page pattern.

5 Calculate the average distance by adding the three measurements and dividing by three.

(-) Counterclockwise
(Avg. distance > 2.0 mm)

Correction Distance (mm)	VR201 Setting
-0.30	-1
-0.60	-2
-0.90	-3
-1.21	-4
-1.51	-5
-1.81	-6
-2.11	-7
-2.41	-8
-2.71	-9
-3.02	-10

(+) Clockwise
(Avg. distance < 2.0 mm)

Correction Distance (mm)	VR201 Setting
+3.02	+10
+2.71	+9
+2.41	+8
+2.11	+7
+1.81	+6
+1.51	+5
+1.21	+4
+0.90	+3
+0.60	+2
+0.30	+1

6 Adjust VR201 so that the average value becomes 2.0 mm (see the table to the left).

Note: For example, if your average distance is 2.6 mm, the difference is 0.6 mm and you should set VR201 to a setting of +2.

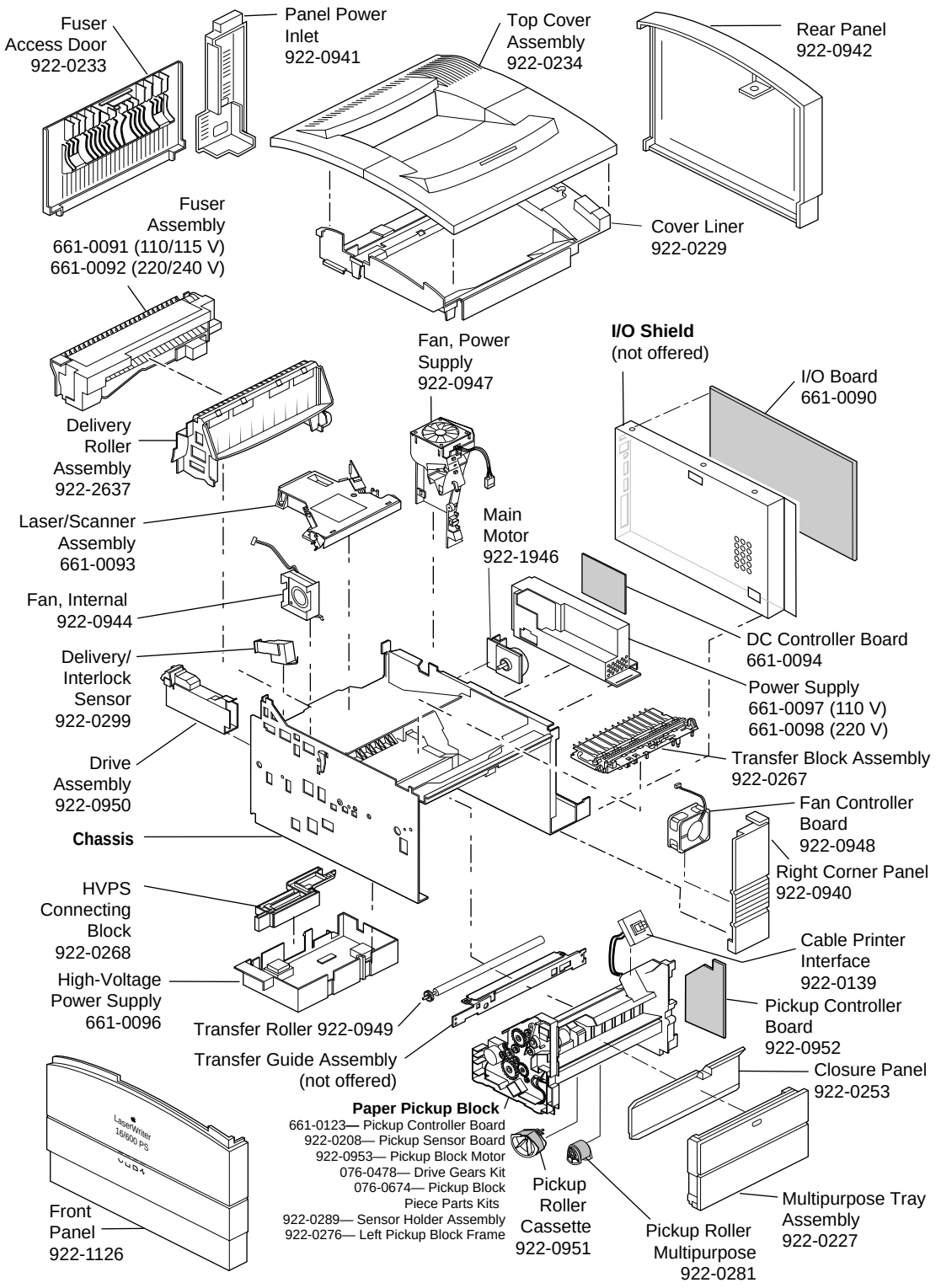
7 Print three more test pages. If the average registration distance is not 2.0 mm, repeat this procedure.

Exploded View

LaserWriter 16/600 PS

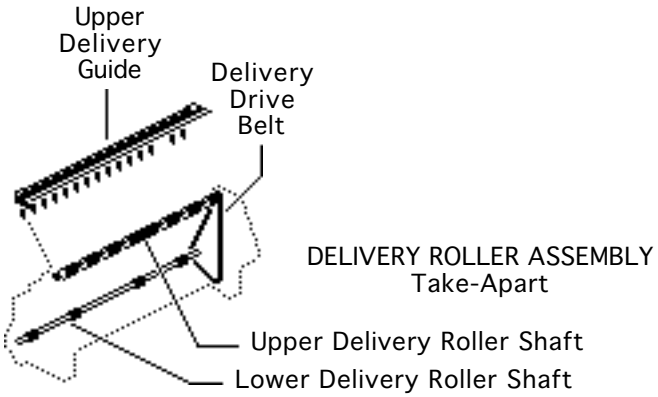
Overall Exploded View

16/600PS Exploded View

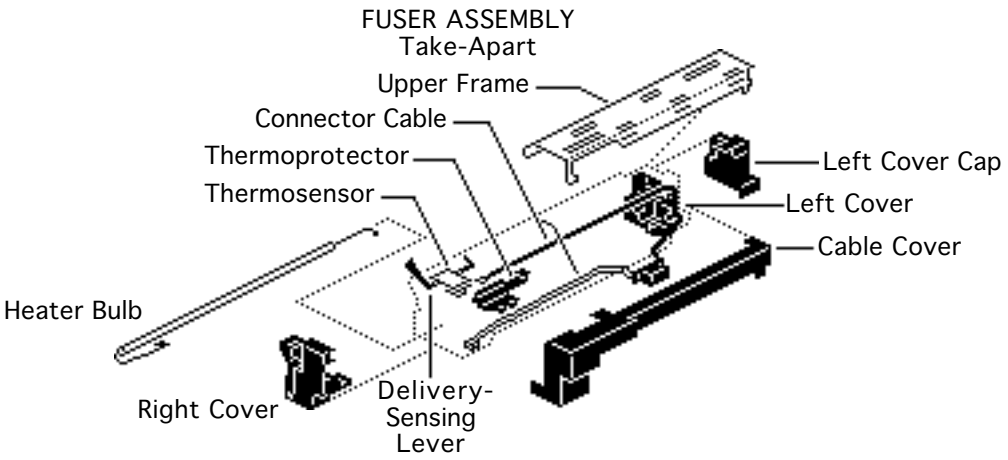

Fuser Access Door 922-0233
Panel Power Inlet 922-0941
Top Cover Assembly 922-0234
Rear Panel 922-0942
Fuser Assembly 661-0091 (110/115 V) 661-0092 (220/240 V)
Cover Liner 922-0229
Fan, Power Supply 922-0947
I/O Shield (not offered)
I/O Board 661-0090
Delivery Roller Assembly 922-2637
Laser/Scanner Assembly 661-0093
Main Motor 922-1946
Fan, Internal 922-0944
DC Controller Board 661-0094
Power Supply 661-0097 (110 V) 661-0098 (220 V)
Delivery/ Interlock Sensor 922-0299
Transfer Block Assembly 922-0267
Drive Assembly 922-0950
Fan Controller Board 922-0948
Chassis
Right Corner Panel 922-0940
HVPS Connecting Block 922-0268
Cable Printer Interface 922-0139
High-Voltage Power Supply 661-0096
Pickup Controller Board 922-0952
Transfer Roller 922-0949
Transfer Guide Assembly (not offered)
Closure Panel 922-0253
Paper Pickup Block
661-0123— Pickup Controller Board
922-0208— Pickup Sensor Board
922-0953— Pickup Block Motor
076-0478— Drive Gears Kit
076-0674— Pickup Block Piece Parts Kits
922-0289— Sensor Holder Assembly
922-0276— Left Pickup Block Frame
Pickup Roller Cassette 922-0951
Pickup Roller Multipurpose 922-0281
Multipurpose Tray Assembly 922-0227
Front Panel 922-1126

16/600PS Exploded View

Delivery Roller Assembly Exploded View



Fuser Assembly Exploded View



Pickup Block Exploded View